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The Essential Data of Placer Investigations—II

Points to Be Ascertained and Precautions to Be Taken in the Examination and Valuation of Placer Ground before Exploitation

BY J. P. HUTCHINS*

In the previous article the general influence of geographical and topographical conditions was treated; also the influence of depth of deposit and some other local conditions. In the present paper the various matters affecting cost of operation and consequent probable value of deposits are further considered in detail.

STEAM SHOVEL WORKING IN THE ATLIN, BRITISH COLUMBIA

The Interference of Clay

Clay may interfere seriously with the excavation, discharge from the buckets, screening and sluicing of material. It may exist in beds as overburden or intercolated or in lenses or as a content and mixed with the alluvion. It is likely to be encountered in countries having, like granite, large proportions of felspathic constituents in the country rocks and particularly common, where, as in the tropics, saprolitic action by the agency of percolating waters laden with humic acid and vegetable matter, is very rapid. Particular design, construction and manipulation are needed for clay. Usually valuable metallic content does not exist in clay beds, the circumstances of deposition out of still water or slow current not being conducive to a contemporaneous transport and to lodgment of heavy metallic particles at the same place. But subsequent saprolitic action may have changed material having metallic content to a clay; thus does gold occur in a clayey bedrock or bottom. The determination of the condition of the metallic occurrence in clay, or clayey material, or merely near or in contact with them is a matter of importance for, if the metal is merely near or in contact with them, it would be not only unnecessary but even harmful as well, to attempt to manipulate it so as to cause disintegration, for this would tend to bring the metal into contact with clay and clayey material with resultant adhesion and loss. A considerable clay content makes a large supply of water essential for paddock dredging, as clay goes into suspension and, in making the water muddy, causes losses of small particles of gold. Clay is a drawback to hydraulic and drift mining operations also but to a less degree. Hydraulic mining of clayey gravel or that having clay overburden and beds, includes the use of long sluices, drops, etc., and these are often effective in thorough disintegration. Clay in drift-gravel can generally be avoided in excavation and not

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allowed to mix with the gold-bearing gravel. When drift gravel is clayey, similar procedure, to that noted above for hydraulic mining, must be resorted to.

Buried Timber

Buried timber is a serious obstacle to dredge operation and has been fatal to several installations in New Zealand, Australia and the tropics. Its occurrence is generally irregular. Its condition may vary from one of almost perfect preservation to one of complete decomposition. Where as in the tropics logs of hard wood over 5 ft. in diameter and over 50 ft. long, in a perfect state of preservation, have been found, it would be disastrous to any enterprise inaugurated without a full realization of such occurrence.

It often happens that a large per cent. of the valuable metallic content is found on and in the bedrock to a depth of several inches, often as much as several feet, so detailed information in this regard is valuable. Its hardness, contour and irregularities must be known; the penetration, of metallic content into it, is important, for this may have progressed to such a depth that much of the gold can not be recovered at a profit. A sticky saprolitic bedrock with metallic content makes difficulty in sluicing. Rough, jagged, blocky bedrock is a serious drawback to recovery.

Difficulties of Frozen Ground

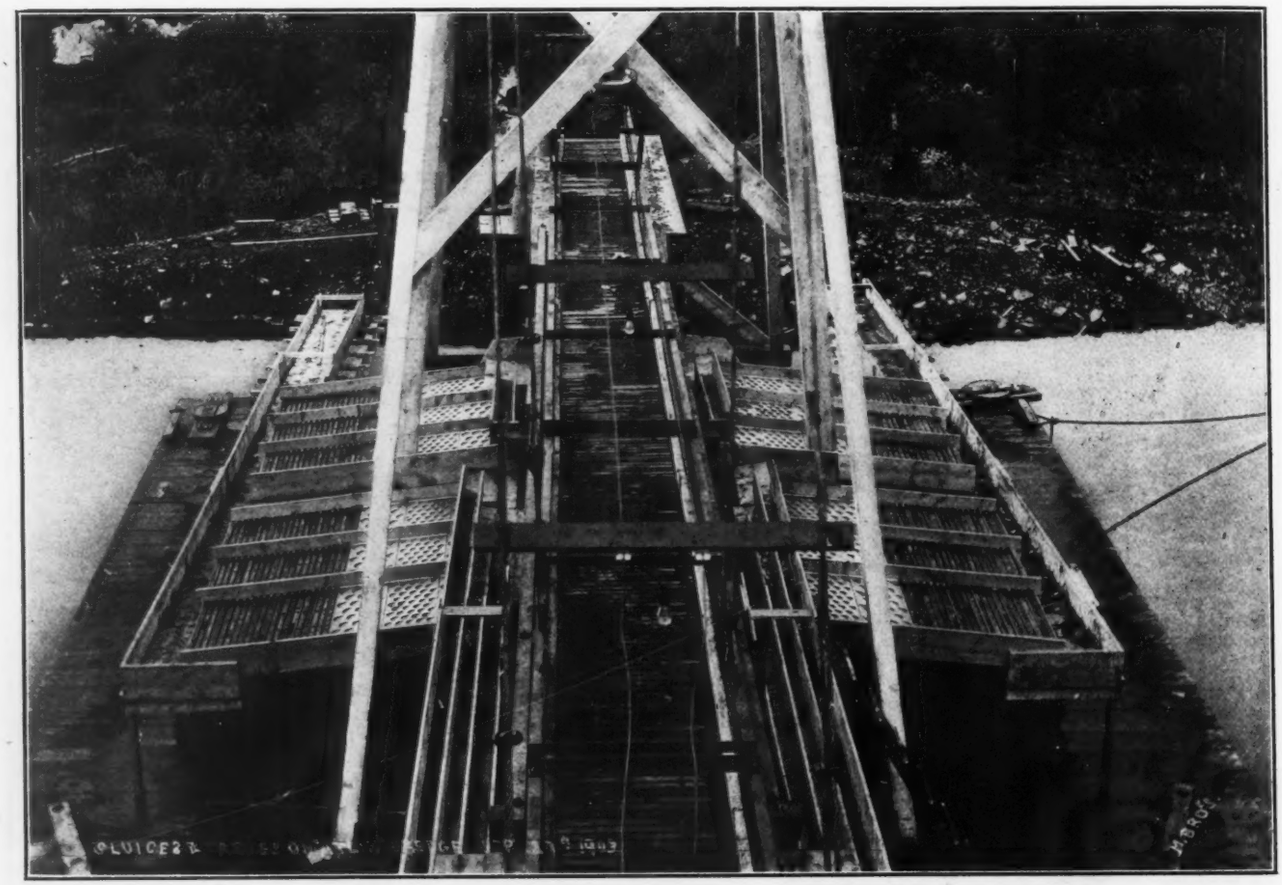
Perennially frozen ground is common in frigid climate. There are large areas now unworkable because of this condition which is an obstacle to excavating, screening and sluicing by mechanical methods. Frozen ground is generally found in the valleys of small creeks, where there is an inconsiderable sub-surface flow of water and where overburdens of muck and moss are encountered. Solidly frozen gravel can not be worked successfully by any mining method not first employing natural or artificial means of thawing. It is not impossible to excavate frozen ground with powerful machinery and powder but the metallic content cannot be extracted unless the material is first thawed.

Frozen gravel is a serious obstacle to hydraulicking and drifting. Ample thawing areas must be provided for hydraulicking to permit sun, air and water to have a maximum warming effect. Drift gravel, if frozen, must be thawed artificially. The cost of thawing may vary considerably and it depends upon the conditions encountered. Muck and other material having a large content of water thaws slowly. "Dry frost" yields to thawing agencies much more rapidly. A cost of 29c. per cu.yd. is given by A. J. Beaudette[1] for steam-thawing material partly frozen to a depth of about 18 ft. (Bulletin 314 U. S. Geological Survey, Pp. 32 and 33). Generally a larger cost than this will be noted for solidly frozen ground.

Water Supply and Power

Water is indispensable to placer mining operations and a large supply of cheap water is needed for hydraulicking; in some instances over 100 second feet. A constant supply though not always indispensable is advantageous. A comparatively small supply (0.5 to 1 second-foot) is usually ample for a gold dredge, unless there are features like excessive seepage and a large clay content that make more water necessary. A constant supply is usually necessary if continuous operation is anticipated. Drift mining in working comparatively small amounts of material needs little water. Sub-surface supplies are often to be had by drilling. It often occurs that it is not necessary to supply water to a dredge pond by reason of the water level of the placer being convenient.

Dredging is now being carried on by using water, under pressure, directly on the dredge by means of impact wheels. The water is carried abroad by articulated pipes. Hydro-electric installations may give cheap power particularly well adapted to the operation of placer-mining



GOLD SAVING APPARATUS OF A MODERN DREDGE

[1]Government mining engineer for Yukon Territory.

machinery. Steam power requires coal, oil or wood fuel. The cheapness of getting such fuels must be carefuly investigated.

Labor

Unhealthful climate causes bad labor conditions and tropic climate at low altitudes always has inefficient and, therefore, generally costly labor. A wage of about 50c. per day may seem conducive to cheap exploitation; in reality, and particularly when machinery of any sort is used, labor cost is often high through its low efficiency.

These must be known for obvious reasons. The possibilities of difficulties resulting from exploitation and the formation of hostile associations, such as have harassed hydraulic mining in California, are worthy of consideration in placer mining investigations which contemplate the treatment of large volumes of material.

Cost of Supplies, Installations and Operations

Food and supplies for men and beasts of burden and their costs must be investigated. These are generally in inverse proportion to difficulties of transport. Mining supplies and repairs are similarly affected. The possibilities of depending upon local sources for various supplies and repairs must be carefully considered. The costs of installation and operation under conditions peculiar to the area under investigation are important.

Installation and operation costs in new and inaccessible areas are difficult to ascertain. Both these considerations, when applied to areas of hostile environment must include liberal allowances. Placer mining of the open-cut type particularly, is extremely sensitive to seemingly unimportant factors. The greatest care is needed lest some of these factors be overlooked in an examination.

By-products

By-products are of increasing importance. Thus platinum, iridium and other metals of the same group, whose value is greater than that of gold, must be sought and saved. Much of these metals is lost through ignorance of their characteristics and value. Diamonds, monazite, rubies, zircon and other minerals occur in placer deposits, and there may be other by-products, such as valuable timber. The occurrence of black sand must be observed very carefully. Its characteristics and currents may have an important bearing upon the conclusions.

A discussion of the various phases of placer investigation would make a bulky volume; this article is merely to emphasize the features noted, with the particular idea of showing that the investigation of placers is a delicate matter requiring care, experience and judgment and, in addition, keen observation and general practical knowledge to a great degree.

The Arizona Copper Company Ltd.

The report of the Arizona Copper Company, Ltd., for the half-year ended March 31 last covers the period during which operations were hampered by the bursting of the Detroit dam and by the difficulties in obtaining supplies of coal. Nevertheless a net profit of £248,178 was made, and £170,988 distributed as dividends. A suitable amount is being kept on hand for capital expenditure required to make good the damage.

We give the following extracts from Manager James Colquhoun's report: "The half-year opened under very encouraging conditions. The mills were ready to make an increase in output, and the market value of copper had advanced. The outputs in October and November were an improvement on the three preceding months. We were still short of miners, but our forces were increasing. On Dec. 1 rain commenced to fall and it continued without intermission until the night of Dec. 3. The dam of the Detroit Copper Company gave way, and our railway was practically destroyed. The lower portion of our smelting plant, our machine shops, the round house, and all of our railroad yards were buried in the débris. Our car repair shop, a large brick building, was absolutely destroyed; many houses and the contents of a lumber yard had been carried down Chase creek, and most of these were piled up in a confused mass in our smelting yard. Production was, of course, at once suspended, and our forces were diverted to the work of repair.

"By Dec. 23 the Coronado railway was in shape to resume traffic, and the furnaces were also ready to resume smelting. Shortage of fuel, however, made for further delay, and, as a result, the combined outputs of December and January amounted to no more than 1176 tons of copper. But for those untoward circumstances the output of the half-year would have been 7444 instead of 6144 tons of copper, and the cost would have been much less.

"We have also suffered from shortage of fuel. This was due to the inability of the Santa Fé railway to carry the traffic. Our stock of coke was sufficient to tide us over, but the coal stock was inadequate, although it amounted to more than three months' supply. Fuel was purchased freely in El Paso, Chicago, and New Orleans, but while it was easy to buy, it proved impossible to obtain delivery on account of the general shortage of cars. The shortage, which commenced at the end of last July, still continues.

"The development of the 700-ft. level, Coronado, is meeting with gratifying results. The discovery of 5 per cent. ore at a depth of 805 ft. is a most encouraging indication. The unchanged conditions on the 900-ft. level, west shaft, merely show that at that point the shaft must go deeper to strike sulphide ore. Altogether, everything urges us toward deeper mining on the Coronado vein. The new vein in the Petaluma is an exceedingly valuable discovery. As for the Clay, ore of good value is now being extracted from this property, which will be best developed by following the ore and mining it as it is uncovered. The Queen and Mexican groups are now in shape to yield a fair output of ore of higher than average grade. The indications are that these groups will prove highly productive.

"Notwithstanding the flood and other troubles, the quantity of ore treated was practically the same as during the preceding term. The yield, however, fell from 2.14 to 1.95 per cent. The decline in yield was, I believe, due to the shipment of a good deal of exceedingly low-grade material, much of which was unfit for shipping. Closer supervision is required in the Humboldt country."

At the smelters 55,379 tons of ore and concentrates and 1300 tons of slag and tailings were heated, yielding 5679 short tons of metal. In addition 465 tons of fine copper were produced from precipitate. In the concentrators 44,597 tons of concentrates were produced from 303,980 tons of ore. In addition unconcentrated ore to the extent of 10,737 tons was smelted. The average yield of the ore mined was 1.96 per cent.

The Russian Iron Industry

The following figures showing the condition of the Russian iron and steel industry during the calendar year 1906 are communicated by a correspondent from official sources. The figures are in metric tons:

	Pig Iron.	Billets, Ingots, etc.	Finish'd Prod'ts.
Stocks, Jan. 1... ..	766,408	145,876	405,807
Production, 1906...	2,641,723	2,643,354	2,307,830
Total.....	3,408,131	2,789,230	2,713,637
Stocks, Dec. 31.....	1,289,742	188,066	334 912
Consumption....	1,118,389	2,601,164	2,378,725

The consumption given is only that of domestic products, as the imports and exports are not included. There are six producing districts in the Empire, of which South Russia and the Ural are the more important, followed by Poland, the Moscow, the Volga and the Baltic districts in the order named.

The metric system has been introduced in Denmark by a law of March, 1907. The law provides that the old weights and measures may be used for a period of five years in conjunction with the new. However, all government and local authorities may use the old system for only two years to come.

Mining and Smelting at Granby, Missouri

Geology and Ores of the Granby Zinc-Lead District. How the Ores are Mined, Treated and Smelted and the Mines Developed

BY EDWIN T. PERKINS*

The Granby mining district is situated in the central part of Newton county, Mo., and is about 25 miles southeast of Joplin. Granby is on the main line of the Texas division of St. Louis & San Francisco railroad, and a branch of the Missouri Pacific railroad connects the district with Webb City and Joplin. Thus, the facilities for marketing the ore are not only good, but there is competition, so that the rate is much lower than formerly. While in many respects the character of the ore deposits here is different from those immediately about Joplin, the Granby field is a part of the Joplin lead and zinc district.

In the year 1847 a miner named Foster, returning from a prospecting trip farther west, stopped here over night. Seeing some rock taken from a shallow hole made for a well, he recognized it as lead ore and remained in the district for several years. Many people were attracted and considerable ore was mined and smelted on Scotch hearth furnaces erected for that purpose. During the Civil War it is said that both the Confederate and Federal armies smelted the lead and made bullets as they passed back and forth over this territory. For several years prior to the building of the railroad in 1870, the zinc ore had been saved, the miners realizing that it would be of value when the railroad made it possible to market the ore. The production of this ore soon ranked above that of lead, which place it has held ever since.

Geology

The area has a general slope toward the north, the surface being broken by valleys of more or less intermittent streams which empty into Shoal creek. Passing over two or three miles of rough and broken country, the prairie is reached, which is the usual flat country found back from the "brakes" of the larger streams. It is on the edge of the prairie and on the broken slope toward Shoal creek that most of the mining in this community has been done.

Most of the rocks encountered in this area belong to the Mississippian age,[1] and are mostly broken flint, passing into flint and limestone. The thickness of the flint varies from a few feet to possibly 150 ft. The limestone is sometimes found at shallow depths, and when it is solid, or not interlaid with flint it is considered unfavorable to ore deposits. The Mississippian limestone is about 400 ft. thick and it is in this formation that the ore occurs.

Above the Mississippian limestone there are small isolated areas of sandstone and shale belonging to the Pennsylvanian period. These are found on the slopes of the hills and the prairie, and were evidently deposited in the low places made by the erosion after the Mississippian period, and are the small remains of a formation that was probably rather thick.

The economic ores of this district are those of zinc and lead. Of the former, the more important at present is the silicate; though frequently carrying zinc carbonate, it is nearly always the hydrous zinc silicate. This comprises about two-thirds of the output of the camp and is the "silicate" or the "gray-jack" of the miners. Zinc sulphide or blende is the ore next in importance, and forms about two-ninths of the total output. It is called "rosin" jack by the miners. Lead sulphide, with a little lead carbonate, makes up about one-ninth of the total output of the camp. Granby is noted for its variety of oxidized minerals, both as ordinary crystals, and as pseudomorphs after other minerals, especially calcite. Many beautiful specimens of calamine, smithsonite, hydrozincite, cerussite, pyromorphite and leadhillite have been found.

Ore Deposits

The first mining done here was for lead ore which occurred usually in irregular shallow deposits, mainly galena crystals which had a coating of partly oxidized material; mixed with the clay was some cerussite or dry bone. As the mining went deeper the lead ores became associated more or less with zinc ores, especially silicate, which was counted worthless as there was no market for it. Later this was saved on the dump and finally worked over.

The silicate deposits occur in "runs," which are more or less clay-filled openings between layers of flint and clay. These evidently have been and often are still underground water courses and usually occur in from two to four deposits, one below the other, with a layer of flint several feet thick between the deposits of silicate and clay. These runs are from a few feet to sometimes 40 or 50 ft. wide, averaging about 15 ft., and seem to have a definite relation to the deposits of limestone around the edge of which the runs almost invariably follow. These lime "bars" seem to be thick, often coming close to the surface and extending to considerable depth, and, dipping at a tolerably steep angle, form one side of the ore deposit. The other side of the ore deposit is usually marked by a peculiar dolomitic limestone, which is silicious, and on this account called "sand" by the miners. This seems to have some relation to the surface remains of the Pennsylvanian period, though just what has not been determined. At any rate the miner here hunts for the sandstone outcrop, and going to one side or the other looks for the more or less loose, broken flint and clay formation which is usually found above the run. While some silicate has been found near the surface, most of the runs are found between the levels from 50 to 150 ft.

The blende largely occurs in flint, deposits of which are so familiar throughout the Joplin district. They usually occur at a greater depth than the silicate, but when they are found at or near the silicate level the ore is mixed, being blende partly oxidized to silicate. This makes a mixed product which, though the zinc content is greater, commands about the same price as the straight silicate ore. The deepest deposits of blende worked so far have been at 215 ft. but ore has been found in drill holes as deep as 300 and at 500 ft., but it is only of late that interest has been attracted to these deeper levels. They are now being sought after and before long something more definite will be learned concerning them.

Mining and Milling

The methods of mining and handling the ore in the Granby district may seem crude but they are well adapted to the existing conditions. The machinery is such that it can be easily moved from place to place as it becomes necessary to abandon one shaft and move to another. In the hard face ground where the orebody and the adjacent rocks are hard and solid enough, pillars of the solid rock are sufficient. Steam drills are used to advantage in breaking this rock, and the standard of a day's work is more the amount of dirt broken than the number of feet drilled, the amount of drilling being dependent on the situation. The holes are usually squibbed to permit of more powder being used in the final shooting. The broken dirt, handled in cans of from 600

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[1]Probably the Keokuk formation. See "Geology of the Granby Area," by E. R. Buckley and H. A. Buehler, Vol. 2, Second Series of the *Report* of the Missouri Bureau of Geology and Mines.

to 1500 lb. capacity, is trammed to the shaft on trucks, hoisted and dumped into the hopper of the mill. The details of the mill vary with nearly every case, depending on the kind of ore to be handled, whether it contains lead and silicate, or merely blende.

At the mill the ore goes to a crusher of the Blake type, to rolls, then to a ½-in. trommel, the oversize returning to the rolls, the undersize going to a rougher jig of five cells 30x40 in. with ⅛-in. grates. The hutch from the first three cells of the rougher goes to the cleaner jig with five cells 24x36 in. with 7-mesh screen. The hutch from the fourth and fifth cells of the rougher goes to a 1/16-in. trommel, the undersize to the sand jig, and finally silicate, all from one jig of four cells. Referring to the diagram, one can see that the ore is thoroughly sized before going to any of the jigs, first by trommels and later the fines by hydraulic separators. The ore from both the hutch and from above the screens is wheeled out to receiving bins, the chats to the second pair of rolls and the tailings, after accumulating in settling boxes, to the tailing and sand dumps.

The silicate "diggins" are usually in a mixture of broken flint and reddish brown clay, and require timbering. Sometimes, when the caprock is sound, merely a post now and then is all that is necessary, but otherwise the timbering must be carried right along with the work, and requires

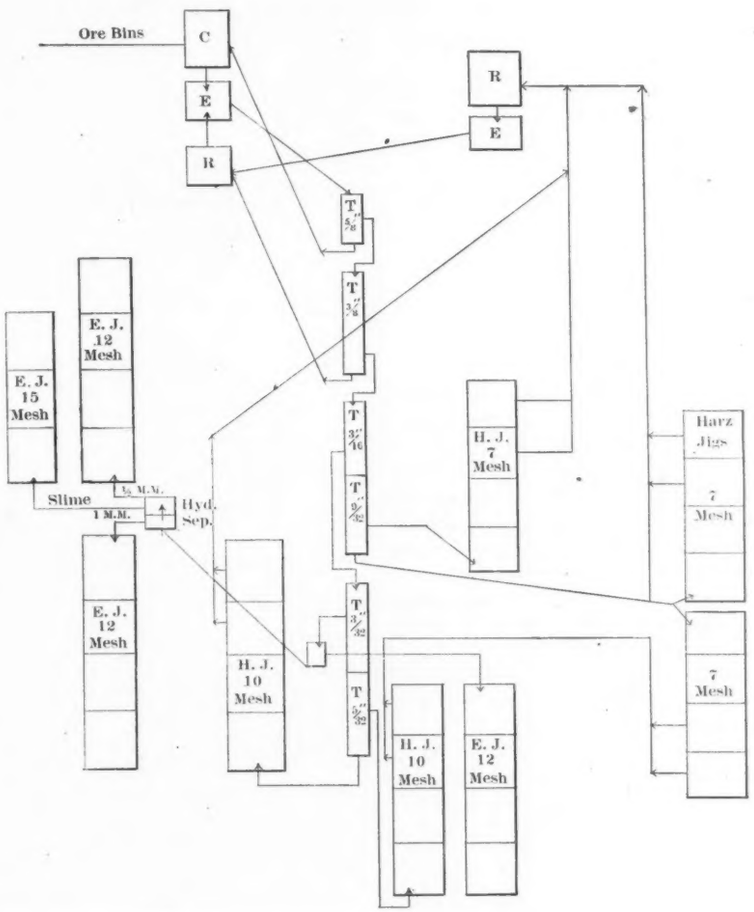


DIAGRAM SHOWING METHOD OF HANDLING ZINC ORE

the oversize to the rolls and back to the trommel and to the sand jig. The chats from the rougher and the cleaner go to rolls over screens and to the sand jig. This method is adapted to handling a large amount of dirt with a small percentage of ore.

The mill of the Granby Mining and Smelting Company is especially adapted to handling high-grade ores and separates advantageously mixed ores of galena, blende and silicate. Often four grades of ore are obtained—first lead ore, then clean blende, then mixed blende and silicate, considerable skill. Sets consisting of two posts and a cap are placed about 6 ft. apart and covered with spiling and filling to hold the roof. The width varies with that of the orebody; if wider than 12 ft., a heading is carried as far as practicable, then another heading is run beside the first one and carried up to 12 ft. wide, and so on until the full width of the orebody is taken out. The first heading run is filled with waste rock from the subsequent headings. The ore, which is usually much covered with clay, is dumped upon a platform, where it is washed by the stream of water pumped from the mine. This mixture of ore and flint is thrown over a 1¼-in. screen, standing at an angle of 45 deg., and the coarse sorted by hand picking. This makes up the lump ore. The material that is part ore and part flint is pounded up and either again hand sorted or, if too finely mixed, thrown with the undersize from the screen upon the hand jig, from which two products are obtained: "nut" taken from the jig sieve and "smittem," which comes from the jig box under the screen.

Marketing the Ore

Though sometimes outside smelting companies get a carload lot of ore, the bulk of the product is sold to the Granby Mining and Smelting Company. The lump silicate is shipped to the smelter as it is, the nut and smittem containing from 0 to 80 per cent. ore are concentrated at the mill and a product averaging 43 to 45 per cent. zinc is made. The price is advanced or lowered $1 for every point over or below 44 per cent. zinc, and a deduction of 65c. per point each of sulphur, iron and lead over 1 per cent. is made.

The Water Problem

Since deeper mining has been undertaken and the ground has become open from old workings, both the surface and the underground water has to be handled, and during wet seasons this is almost impossible with the best of pumps. The favorite pump is a derrick lift pump, which is a modification of the old Cornish lift type and capable of handling large quantities of water and more advantageously than steam pumps, even to a depth of 215 ft. If work were carried on continuously a steam pump could handle the water with more economy than the lift pump, but as only one shift is worked, the water rises over night, making the lift pump almost a necessity under the present system.

Methods of Prospecting

While the churn drill is used rather extensively for prospecting with the silicate deposits, shaft sinking is far more prevalent. The runs of ore are irregular, often pitching down 12 or 15 ft., and if very far from the shaft it is considered cheaper to sink a new shaft rather than rip up the bottom of the drift to where the ore has pitched down. In sinking on a new location, it is the plan to try to get immediately over the run so that the shaft will be in softer ground. If the shaft does not go down on the channel it is next to impossible to drift out to it unless there is another shaft or drill hole to give the depth; for the channel may have pitched up or down, the flint and clay surrounding it giving no hint as to the location of the orebody. The churn drill could be advantageously employed to replace a great deal of this shaft prospecting and there seems to be a tendency in this direction.

Labor

Miners are scarce with wages at $2 for eight hours' work, but as the mines are nearly all operated under the general leasing system, most of the men prefer to work for themselves, one or more miners interesting one or more merchants. Two lots each 200 ft. square go with each shaft operated. The Granby Mining and Smelting Company assists the miners working on its land in sinking the shafts by furnishing machinery and coal and paying $150 for sinking 100 ft. on a sliding scale. If no ore is found the miners owe nothing to the company; but the coal bill and the advance paid in sinking the shaft are charged against the ground; so that should ore be found later, the bills are paid by applying a small percentage of each week's turn-in on the amount. In this manner it is possible to prospect and operate mines on very limited means.

Smelting

All the zinc ores produced are shipped to the smelters in the Kansas gas fields, in St. Louis, or in Illinois. However, all the lead ore mined in the Granby district, and a considerable amount from the Joplin district are smelted here. The ore is first cleaned over the mill, making a product that will assay 82 to 85 per cent. lead. This is smelted on five Jumbo furnaces, which are a modification of the Scotch hearth furnace. The charge is 12,400 lb. galena, 1200 lb. white fume, 400 lb. blue fume, 1 bushel lime, about 1000 lb. coal being used per shift, and is smelted by four men in about 10 hours. In working the fires the men alternate, two being before the fire about 15 or 20 min.; then they are relieved by the other two. About 85 per cent. is obtained as lead; 9.5 per cent. as white fume, which assays 73 per cent. lead; 3 per cent. as blue fume assaying 66 per cent. lead, and 2.5 per cent. slag containing 40 per cent. lead. The gases from the furnaces are drawn by a 6-ft. American blower fan through a steel settling chamber where the blue fume is obtained, and then through about 200 ft. of steel trail and goose-necks and conducted into a bag house of 640 bags, 18 in. in diameter and 30 ft. long, where the white fume is obtained. The fume is allowed to accumulate, is burned and again run over the furnace. The men are required to make 65 per cent. of lead by weight from the mineral, 60 per cent. from the white fume and 50 per cent. from the blue fume, for which they are paid $2 per day, and for every pound of lead above the " per cent." they receive ¼ cent apiece. Their wages average more than $3 a day.

While this system of smelting lead has been practised at Galena, Kan., Joplin, Mo., and Collinsville and Alton, Ill., the degree of perfection at these places has not been up to that attained at Granby. At the former places it is used merely as a preliminary step to the blast furnace method, the lead being usually refined and the slag run through the blast furnace. At Granby the plan is to make a pure soft lead in the first process and with as little slag as possible.

Lehigh Valley Coal Company

This company operates the coal properties attached to the Lehigh Valley Railroad Company, and is controlled by that company. Its report for the year ended June 30, 1907, shows capital stock, $1,965,000; funded debt, $12,957,500; certificates of indebtedness, $10,537,000. These certificates represent chiefly advances made by the railroad company. The income account shows surplus, July 1, 1906, as $1,974,453; net earnings for the year, $111,250; total $2,085,703. Improvements and adjustments made amounted to $297,839, leaving a balance of $1,787,864.

The total production of anthracite coal from the lands owned and controlled by the Lehigh Valley Coal Company and other companies in which it and the Lehigh Valley Railroad Company are interested, through ownership of stock, was 7,667,666 tons in 1905-6, and 8,867,255 tons in 1906-7; an increase of 1,199,589 tons, or 15.6 per cent. The coal produced and purchased last year by the Lehigh Valley Coal Company and affiliated companies was 87.1 per cent. of the anthracite coal transported by the Lehigh Valley Railroad. From the operations of the Snow Shoe property there were mined 187,390 tons of bituminous coal, as compared with 210,728 tons for the previous twelve months.

The Lehigh Valley railroad transported last year—not including supply coal for its own use—a total of 14,374,216 tons of coal and coke. The revenue from this tonnage was $15,110,899, being 41.9 per cent. of the gross earnings of the road.

The net results for the fiscal year have been seriously affected by many adverse circumstances. At the beginning of the year a cave-in occurred at Warrior Run, resulting in an explosion of gas that fired the mine, making it necessary to flood the entire operation. In October Exeter breaker was demolished by a tornado. Centralia breaker was idle for a period of seven months due to the breakage of machinery and the need of extensive repairs that could no longer be deferred without endangering the entire plant. Not only was the tonnage from these operations lost to the company at a time when most needed and productive of the greatest profit, but the expense of reopening the Warrior Run mine and repairing the damaged breaker was so heavy, combined with other conditions, as to reduce the earnings to a minimum for several months. The anthracite coal-handling plant and storage yard at South Chicago, with a stock of coal exceeding 40,000 tons, was entirely destroyed by fire in November, and, although partially covered by insurance, the loss of these facilities was an additional burden upon the company. Further, the shortage of cars was so severe during the winter and early spring as to require many of its collieries, spread over the extended region in which the company's operations are conducted, to close down frequently during that period with less than a day's output, and this, with the inability of connecting roads to move promptly to destination such tonnage as had been sold, resulted not only in an excessive cost of operation, but prevented the sale of coal during a time when it could have been marketed at the greatest profit.

The Warrior Run colliery and also Exeter and Centralia breakers, which were rebuilt and enlarged to permit of handling a greater tonnage, are now in full operation. The new Sayre colliery at Mt. Carmel is also in successful operation. The work of rebuilding the coal-handling plant and yard at South Chicago, with an increased capacity, on a basis permitting of more economical operation than the old plant, was begun immediately after the fire, and the same will be in operation before the winter. The construction of an addtional coal-storage building and dock, with a capacity of 75,000 tons, together with necessary machinery for handling anthracite coal, at Milwaukee, has been authorized, and the work is under way. New retail coal yards and trestles have been established at Fifty-ninth street, Chicago, and Syracuse, and a new trestle is in process of construction at Geneva. The coal-handling plant and storage yard at West Superior, and the yards at Thirty-first street, Chicago, and Walden avenue. Buffalo, are being enlarged. The total cost of this work to June 30 was $167,855.

In addition to the foregoing, improvements and betterments amounting to $708,169 were made to the various collieries during the year, of which amount $250,000 has been charged to the special appropriation made from the income of the previous fiscal year. With the rebuilding of the operations mentioned, together with the improvements under way, and the property in a better physical condition than formerly, the future is encouraging.

The *Iron Age* (Aug. 1, 1907) reports that on July 5 the 2000th heat was made in the 1.5-ton Héroult electric furnace of the Rich, Lindenberg Steel Works at Remscheid-Hasten, Germany, on the same hearth. The furnace has been in steady operation since March 22, 1906, running on liquid metal from an open-hearth furnace. It was only when the latter had to be releived that the electric furnace was charged with cold scrap. The dolomite hearth was patched after every heat. It is still intact and promises to stand an additional large number of heats. The cover alone, made of silica brick, had to be renewed every three to four weeks; this takes about two hours and can be readily done on Sundays.

Granite Quarrying in Aberdeenshire, Scotland *

By William Simpson

The largest masses of granite in Great Britain are found in Aberdeenshire and the adjoining counties in Scotland. The granite mountains are the highest ground in Great Britain, and provide some of the grandest scenery in the British islands. The towns of Aberdeen and Peterhead are the centers of the granite trade. The Aberdeen town, and the Kemnay, Tom's Forest, Tellybourie, and Corrennie, which are further inland. Of all these quarries the Rubislaw and the Kemnay are the most extensive, and are in fact the largest in the United Kingdom. Kemnay granite is much in demand for engineering work, such as bridges, dock walls, etc. Peterhead granite is used almost entirely for decorative work.

None of the granite is "mined"; the work is all done in open quarries. The surface of the granite is covered with a thick layer of hard boulder clay, and the

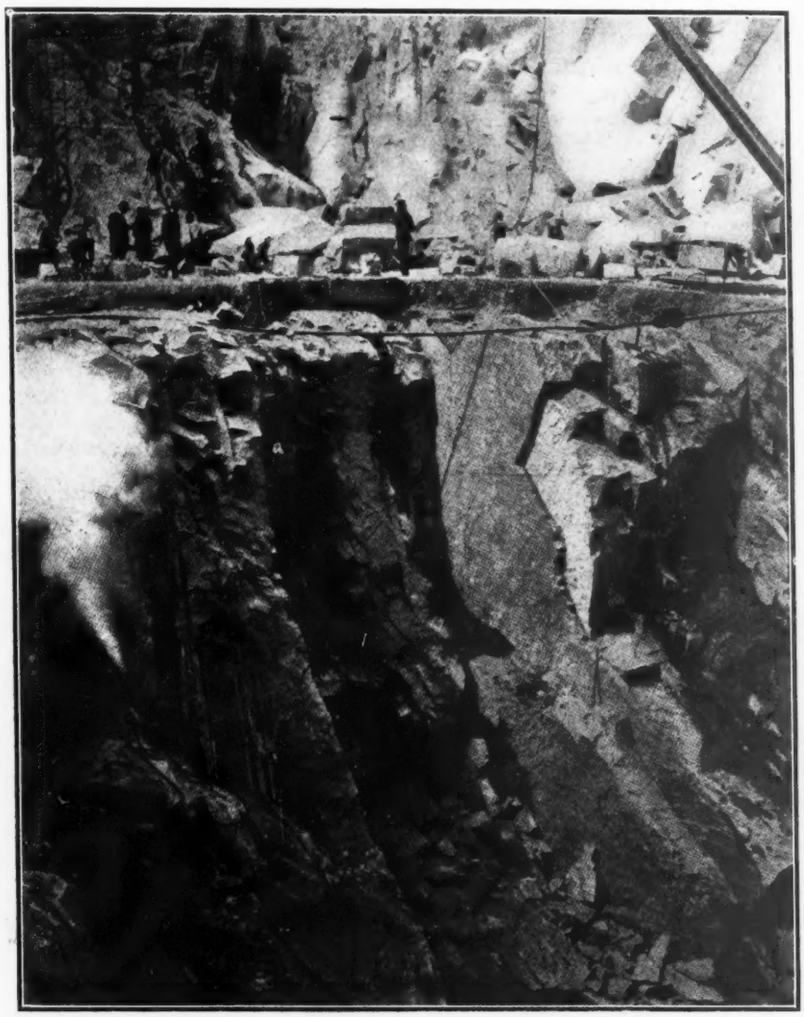


FIG. 2. WORKING FACE, SCLATTIE GRANITE QUARRY

main area extends from the seacoast west about 45 miles, with a width varying from 10 to 20 miles, and there are several smaller detached areas. The remainder of the country consists of Archaian rocks, with here and there some old red sandstone. In the Peterhead district the granite is red in color, but in the remainder of the district gray is the predominating color. The largest quarries are the Rubislaw, Sclattie, Dancing Cairns, and Oldtown, which are situated not far from top parts of the granite are generally worthless owing to decomposition. The method of working is to remove the overburden and top parts of the granite by means of very extensive open pits usually oval in plan. The rock of commercial value is found in isolated "posts," cut off from each other by "bars" of inferior or worthless rock. The joints are very irregular, which makes the quarrying additionally difficult. Fig. 1 gives a good idea of the method of excavating and of handling the rock. At some of the quarries the depth is as much as 300 ft.

*Abstract of a paper read before the British Institution of Mechanical Engineers, July, 1907.

Opening up a Quarry

After a sufficient top area has been opened out in which to conduct operations, the quarry is deepened by sinking in successive benches or "dips" of 40 to 60 ft. at a time, and if possible the actual depth of the dip is determined by a natural horizontal bed-joint, so as to facilitate the excavation of the rock, but, should this not be met with, a dip is rarely carried down more than 70 ft. In working out a dip, a shaft is first opened at an extreme point of the quarry floor close up to the side or wall of the quarry, and from this shaft operations are extended outward, until the whole area of the floor has been excavated to the level of the new dip. The shaft is sunk as quickly as possible the full depth to the main bed-joint, and is opened out laterally to meet the "master" joints traversing the quarry in the direction of working, and thus obtain the best possible working face bounded by rock-joints. The presence of such joints largely determines the direction in which the rock is to be excavated, and a working face assumes the appearance shown in Figs. 2 and 3.

Excavation

The rock is removed by boring and blasting, and for this purpose the working face is usually divided into two benches. The top bench is first worked back to meet a good vertical joint, a distance generally of 20 to 30 ft. from the face, after which the bottom bench is excavated and the rock entirely removed down to the level of the floor of the dip, Fig. 2. Vertical shot-holes up to 21 ft. deep are used to blast out the upper parts of the benches, and breast holes to remove the basal parts of the working face where there are no bed-joints. These latter are placed at an inclination of about 10 to 15 deg. to the horizontal, and are drilled up to 21 ft. long, as the nature of the rock may require, Figs. 2 and 4, and are calculated to increase the efficiency of the blast and level up the quarry floor. As it is not convenient to use the ordinary rock-drill tripod for such holes, a special frame made of timber is employed for this purpose on which the rock-drill is mounted, the frame being loaded with stones to steady it, Fig. 5. As the rock is blasted out the blocks are lifted from the working face by cranes and cableways, but the larger masses, beyond the power of the lifting appliances, are further broken up as they lie.

Rock Drilling

The drilling of shot-holes is done by power-drills worked either by steam or compressed air. Hand-drilling is only resorted to where it is impossible or inconvenient to use a machine-drill, as in bringing down dangerous parts of the quarry wall. The machine-drills are chiefly of the Ingersoll or Henderson types, and the usual motive power is steam. At Kemnay

quarries air-drills have been in use, along with steam, for several years, and the installation is being further extended, while at Rubislaw quarry a complete new air-compressing plant, of the Ingersoll-Rand type, driven by a 100-h.p. shunt-wound electric motor, has quite recently been laid down for exclusively working the rock-drills, the pressure being 100 lb. per square inch.

The drill-bits used are the chisel, cross and Y forms. The practice of the various quarries in the application of these bits to drill a hole differs considerably, some preferring to use almost exclusively the cross bit throughout, but, more commonly, holes are started with cross or Y bits and finished, if deep, with chisel-bits for about the latter half of the hole. The results, however, in the speed of drilling do not vary much, as a hole 21 ft. deep takes on an average about a working day of 10 hours to complete under ordinary circumstances, the speed of drilling being higher than this average at the beginning, and less at the end.

In drilling a shot-hole a change of bit is made at every foot of depth drilled, and the successive diameters are gradually decreased by 1/16 in., owing to the conicity of the hole caused by the wear of the bit, so that a hole 21 ft. deep started with a 3¼-in. diameter bit terminates with one 2 in. diameter. Water is removed from the shot-holes by a small iron closed bucket, from 9 to 18 in. long, made from a piece of tube 1½ in. diameter, let down by a light chain, and the sludge by a sludge-pump, and sludge-spoons of various lengths. The sludge-pump consists of a piece of iron tube from 4 to 6 ft. long, and 1¼ in. diameter, fitted with a plunger and long iron handle. The end is conical, with an inlet hole of ⅜-in. diameter.

Blasting

In granite quarrying the main object is to obtain large blocks, and explosives must therefore be applied judiciously and in a sparing manner. Coarse gunpowder is used in the Aberdeenshire quarries for blasting purposes, as higher-grade explosives, such as dynamite and gelignite, shatter the rock too much, and are not used at all, except to blast away bad rock or in very wet places. No general formula can be given to determine precisely the amount of the charge for a blast, owing to the very irregular nature of the rock, but it is estimated that one pound of gunpowder should produce 8 tons of rock under ordinary conditions of quarrying. In blasting out a long face, vertical holes are drilled right down to the horizontal bed-joint, and at a distance back from the working face generally equal to their depth, and small charges of gunpowder used, the object being to heave the mass on its bed without shattering it. If one end of a working face is bound, as is sometimes the case, a narrow trench is blasted forcibly out between the quarry

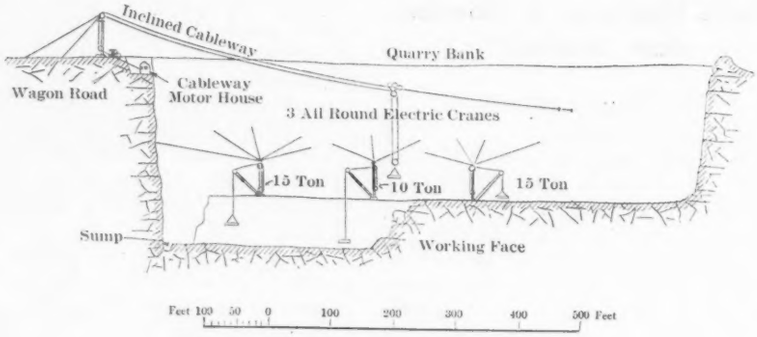


FIG. 1. RUBISLAW QUARRY, SECTION

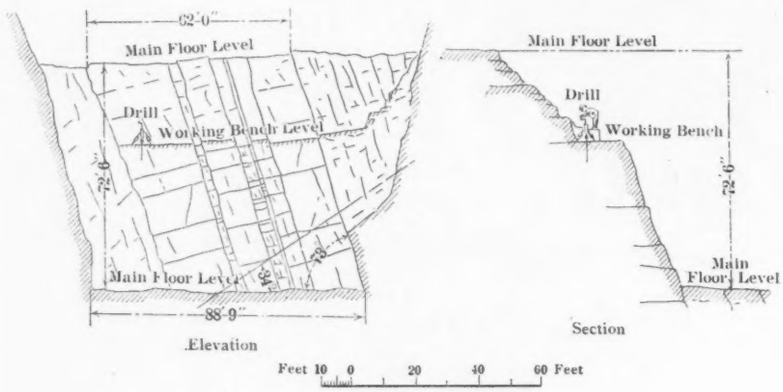


FIG. 3. RUBISLAW QUARRY, WORKING FACE

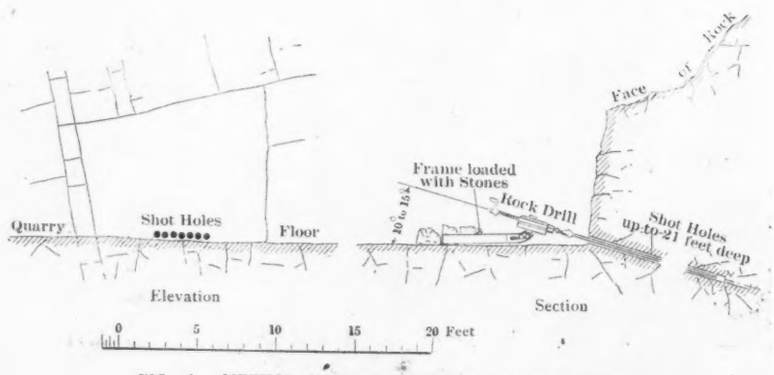


FIG. 4. METHOD OF DRILLING BREAST SHOT-HOLES

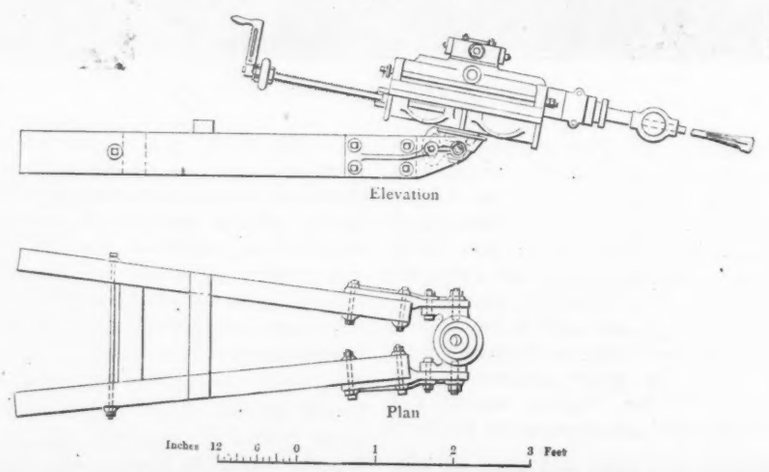


FIG. 5. DRILL FRAME FOR BORING BREAST SHOT-HOLES

wall and the working face to permit this method of blasting being carried out. The mass having thus been shaken and the joints developed, it can be blasted off into smaller blocks, and dragged from the face. For breast blasting, where there are no natural bed-joints, the shot-holes are usually placed in line close together with about 1½ in. of clearance between each at the top, Figs. 3 and 4, but both the position and number are decided by the actual rock-joints, and the quantity of material to be dislodged. Groups of three, five, and seven holes are common, and these may be drilled parallel, radially or in different planes. If dry, vertical shot-holes are filled directly from the top with loose powder passed through a copper filler, but in the case of wet holes, both vertical and inclined, the powder is made up into a cartridge by filling it into thin waterproof tubing, and tying the ends securely. Dry breast holes are loaded from a piece of open end copper tube, 1½ in. in diameter, fixed on the end of a long wooden rod. The regular shot-holes are fired electrically, and the detonator or electric fuse, is placed about 9 in. from the surface of the charge in the loose holes, and is tied up with the cartridge in wet holes. At some quarries a time fuse is also inserted into the charge of each shot-hole as a safeguard against electrical misfire. The charge is rammed home with a timber ramrod, and the holes are stemmed or tamped with granite dust. The electric wires of the shot-holes are connected up in series, this method being preferred to that of in parallel, and the charges are fired by a high-tension electric exploder. The firing is done either during meal hours, or when work has been stopped for the day, unless the nature of the blast is such that the men can readily find safe cover in the quarry. A steam-jet is used at some of the quarries for effectively washing out the tamping and charge of a misfire shot-hole, instead of boring a new one alongside.

Sulphur in Baluchistan

Consul-General W. H. Michael furnishes the following particulars from the results of the examination of the sulphur mines of Sanni made by the geological department of Baluchistan, India. The mines, it is stated, have not been worked for many years and have collapsed to such an extent that they have become very difficult of access; besides which, parts of them have caught fire; some of the clay bands are said to be so full of sulphur that they burn readily. The amount of sulphur impregnating the rock seems quite sufficient to hold out prospects of remunerative working, especially taking into account the favorable situation of the mines at the edge of the Minhhi plain. In the neighborhood of the sulphur mines the rock is traversed by numerous veins of alunite.

Copper Mining Conditions in Chile

In an article to the London *Min. Journ.* (July 20, 1907) a correspondent gives some information as to conditions in copper mining in the province of Atacama in Chile. It appears that the greatest difficulty is the scarcity of labor, the natives being unwilling to work any more than enough to provide themselves with a bare living and the means of dissipation. All labor in the mines has to be by hand, as the altitude makes machine drills inefficient when they are operated with compressed air and the electric drills which have been installed are not running; whether the fault of the drills or of the workmen no one knows.

The grade of the ore worked is over 6 per cent. copper, unless worked for flux, in which case 4 per cent. ore is utilized. The waste filling and dumps of the larger mines will yield 4 per cent. ore, and on some of the smaller prospects the grade of the waste is 5 per cent. oxidized ore. The smelters at Lota and the Sociedad de Atacama quote only for 10 per cent. ore, though if good smelting ore, they are willing to accept 6 per cent. An unusual feature in the copper deposit is depth to which the oxidized zone extends. In the Dulcinea mines it varies from 350 to 400 m. from the surface, and in most mines in this province it exceeds 200 m. This implies that the smelting of the ore is not economically possible unless the proportion of pyrite and oxidized ore is adjusted. Coke comes from England and timber from the United States.

Mining laws are said to be very liberal. A claim of one hectare in area is taxed $10 a year, and once it is surveyed by a government engineer, is freehold as long as the fee is paid. There is no labor condition. Freight on the government railway is not high, but it is difficult to obtain cars without expensive "seeing" of officials. Private railways give better service, but rates are somewhat higher.

The British consul at Amoy, China, reports that the Standard Oil Company is actively proceeding with the erection of a tank installation. The new tank is to hold 750,000 gal. of oil and should be completed by the end of the year. It is also intended to establish small storage tanks at the chief towns in the district, to be supplied by tank-junks sailing from Amoy. Ten years ago the oil imported at Amoy was almost entirely Russian and American, in equal quantities. During more recent years Sumatra has supplied most of the oil, accounting during 1906 for 75 per cent., while America supplied the remainder. When the new tank is in operation, it is expected that America will win back a good deal of the oil trade.

Gravel Channel Cut off by Reef

In the Hidden Treasure drift mine in the Forest Hill Divide in Placer county, Cal., reference to which was made in the JOURNAL of Aug. 10, they some time ago met a "reef" which extends nearly across the gravel channel, cutting out the gravel entirely. It is bedrock 14 to 16 ft. above the regular bed of the channel and the superimposed bedrock comes down on top of it, leaving no signs of any gravel whatever. They have now mined through this with a tunnel about 1400 ft., and are nearly across. Below this "reef" the channel is regular in character and grade, and in the upper or Damascus side they know the channel level, so this intrusion is very puzzling. Harold T. Power, the owner and manager, says that in 31 years of drift mining he has not met a similar occurrence. The reef came in about 2½ miles from the mouth of the tunnel and appeared suddenly, as if uplifted straight from below. Charles Hoffman, who was for years in charge of the Blue Point mine on the same Divide, says that at one time the channel was suddenly cut off, and it was found 60 ft. below its normal grade, though it eventually came in at the proper level. A cross section of it, however, had subsided or sunk 60 ft. below where it had been. In the Hidden Treasure a reverse movement seems to have taken place, the bedrock having risen about 16 feet.

Tin, Silver and Coal in Southern China

The British consul at Wuchow, southern China, reports as follows:

"There has been a large increase in the export of tin in slabs, the quantity rising from 393 cwt. in 1905 to 1093 cwt. in 1906. Of this 561 cwt. came down under transit pass, the rest being brought down in native junks, and paying 't'ung shui' en rout.

"The San Ch'a Shan silver mines are situated 15 miles to the northwest of Kueihsien, a town on the Hsün, or South river, about 160 miles above Wuchow. The mines have been practically closed for some time after running at a loss of £200 to £300 a month. The cost of running them latterly was about £600 a month, including about 5d. a day each for about 250 coolies, and the output was valued at from £300 to £400 a month. The coal used for smelting was Japanese, the monthly consumption being about 100 tons. The cost of delivery at the mines was £2 per ton, inclusive of 12s. per ton for carriage by coolies over the hills from Kueihsien.

"The Na P'o coal mine, near Nanning, which, on account of the increased demand for native coal was re-opened and worked by the authorities as an official speculation, has been doing fairly well."

The West Coast of Mexico

Notes of a Traveler along West Coast of Mexico. Resources of the Country, Transportation, Business Methods and Labor Conditions

BY DWIGHT E. WOODBRIDGE*

Because of difficulties with the Yaqui Indians of central Sonora, and of the late Mexican revolutionary troubles, the carrying of arms and ammunition into western Mexico from the United States has been strictly forbidden. Carrying such contraband across is the one cardinal sin in the eyes of the Mexican customs officers, and multitudes of engineers and prospectors, who should have known better than to try crossing with guns, have seen their guns and revolvers confiscated and, unwilling to proceed without a protection they considered necessary, have turned back at the border.

An application to General Torres, at Torin, Sonora, backed by some valid reason or some good recommendation, will be countersigned and forwarded to the ministry of war at Mexico City, and in eight or ten days will result in the arrival, at the custom-house where one intends to enter the country, of a permit in proper form. It is useless to attempt to carry guns, or even a 22-caliber revolver, without this permit in full and proper style. It is useless, too, to attempt to use this permit twice, or to re-enter the country with a gun that has been in already, even though on permit, or to use a permit for any article not especially and specifically described in the document itself. To be sure there are always ways of getting any articles across a boundary line, and very many guns are taken across at the most carefully guarded offices. I know of one invoice of three repeating rifles, five big revolvers and 1100 rounds of ammunition that went across one night on the train, nearly all for one party.

Exasperating Delays

While the delays of Mexican travel are the constant subject of jokes and are well known, it is probable that few people realize how constant, discommoding and unnecessary they are. On a recent trip of my own, arriving at Guaymas to take the steamer down the gulf of California, or the "sea of Cortez," as the Mexicans quite naturally wish it called, I met Americans who had been waiting 15 days for the ship on which we sailed, and this in spite of the fact that the Compania Naviera del Pacifico, owner of the vessel, had ships enough on the coast to make a departure every three or four days. But the company is operated on the principle that it is better to knock out your competitor than to do business yourself, and its ships are bunched so as to leave Guaymas and other competitive ports in fleets during the day or two preceding and following the monthly sailing of the American ship "Curacao." An American who is compelled to lie by at any of the nerve-wearing ports along the west coast for a week or two on account of the attitude of the company, will always wait a day or so longer for a comparatively comfortable trip on a ship whose cooking is American and whose beds are not a mere name. The "Curacao" leaves Guaymas regularly on the 17th of each month and San Francisco on the 7th. I know of nothing more depressing to an average American whose time is valuable than a wait of a week or 10 days at Guaymas, with its heat, its smells, its poor hotels, unless it be a similar wait farther down the coast.

By November one will be able to go by train south from Guaymas as far as San Blas, on the Fuerte river, and can there get a stage, which will put him in Culiacan in one day's travel. While this is by no means recommended, it will avert the catastrophe of a wait.

As business is now conducted along the west coast of Mexico it is frequently 60 days after one orders a piece of machinery before it arrives at the port of debarkation, after which there may be another delay of indeterminate length before it reaches its destination. By that time one has probably made shift with something else and the need of that special machine has passed. This, naturally enough, does not inure to the advantage of American equipment concerns and agencies located in the centers.

The 300-mile run from Guaymas to Altata usually consumes four or five days, for the ship makes the detour across the gulf to one or two ports of Baja California, stopping at Santa Rosalia, the seat of the Boleo Copper Company, and at La Paz, where the pearl fisheries of the coast are headquartered.

Altata

Altata is entered by a tortuous channel, buoyed by the Mexican Government, but constantly filling up, until the casting of the lead now shows a depth of but two fathoms and a half, for a considerable distance. In the heavy sea that frequently prevails, or in a fog, this is an exceedingly difficult passage to make. The port, like many on the coast, has no piers, and all freight is handled in lighters and on men's backs. An insufficient lighterage capacity is quite common, especially when the Naviera company, in the pursuance of its policy, has two or three ships in port at one time. I have seen a steamship anchored four days outside an inhospitable river mouth taking on a few hundred tons of sugar, because but one small lighter was available.

From Altata to Culiacan, the capital of Sinaloa, there runs a railway about 40 miles in length. Trains go up to the capital and back in one day, and after a day's rest repeat the trip. But woe to the traveler whose ship drops anchor off the railway depot so late that there is less than an hour to accomplish the 1000 ft. intervening between him and the train. The general manager and conductor of that lofty service has a deep, abiding grudge against all human kind, and if he can leave a man for 48 or 72 hours on the flea-infested, pig-ridden, sandy, tropical beach called by compliment Altata, he will do so. As the railway company is willing to run a special train to Culiacan for $100, or will furnish the passenger with a handcar for $6.50 per person, there may be method in his reasoning.

The beauties of the customary tropical landing are exemplified at Altata. No Niagara Falls hackman, in his palmiest day, could equal the fight over fares that takes place at that landing. It is too intensely ludicrous to be maddening, even though it so delays the traveler that he sees his train pulling away without him. But these degenerate longshoremen do work! The heaviest load I have seen them carry from lighter to beach and up the sand, was an upright piano, and barrels of salt or cement are not infrequent loads. Sugar, down the coast, is boxed in 100-kg. packages; these, weighing 220 lb., are universally and easily handled on the backs of longshoremen. And here I would say, that the peons and Indians of the west coast are not lazy, but are willing to do the hardest sort of work, needing merely a proper incentive and competent direction. Guided rightly by men understanding the labor-saving manner of work, they would accomplish tremendous results.

Culiacan

Culiacan is a delightful little capital, a city of handsome senoritas, sunshine and music, and just now is receiving quite an influx of Americans, chiefly engineers engaged in the location of the new Southern Pacific concession that will ultimately connect San Francisco with Mexico City. This influx will increase as construction

*Mining engineer, Duluth, Minnesota.

begins, and one is naturally curious about the result. The Americans to arrive will not all be men of character and stamina, and the peculiar temptations of Mexico will doubtless have their effect, while the influence of these men on the natives may be most deplorable. In the past, outsiders in that country have been too few to have much influence in any direction, for in Culiacan the number has averaged scarcely four to 1000 inhabitants, and in the interior it is far less.

Southern Pacific Developments

The Southern Pacific concession is expected to open the entire west coast to enterprise and to develop the mineral, timber and agricultural resoures, all of which are generally supposed to be very great. This railway connects at Guaymas with the Ferrocarrill de Sonora, a subsidiary company of the Southern Pacific, and is built west to Alamos and south to Cocorit, both in Sonora. By fall it will cross the Fuerte river at San Blas, probably run a branch line to the gulf of California at the fine harbor of Topolobampo, and continue on its way south through Sinaloa. Preliminary work is under way out from Culiacan, some contracts for right of way, etc., have been let there, construction has begun at Mazatlan, 150 miles farther south, and will be pushed both ways, and is under way out of Guadalajara, in Jalisco, and the chief engineer of the company assures me that the line should be through in two years.

At Guadalajara this road connects with the Mexican Central and thereby with the entire Government system, and at the northern boundary with the lines of the Southern Pacific from Benson. There is also a concession for a line from Guaymas northwesterly to a connection with the main line at Yuma, which will materially shorten the distance from San Francisco to the City of Mexico.

Another concession permits a line down the Rio Yaqui from the present terminus at Cananea to a point on the new road just west of Guaymas. This will be built shortly. It will pass through a good mineral region and will assist greatly in subjugating the Yaqui Indians.

Certain rights as to width of concession make it improbable that the main southerly line will go farther into the interior than now planned, or about 40 miles at most, so that it seldom reaches the foothills of the main sierras. This being the case, the road will have less effect on mineral and timber development than is generally believed.

Natural Resources

There is much fine agricultural land along the coastal plain, and this will be extensively developed, though it suffers from lack of moisture and will require elaborate irrigation to be made generally fertile. The Government has just established the irrigation service in Culiacan and will make surveys of the entire region with the idea of curbing the greed of water speculators and of planning for development of storage dams, etc. The manufacture of sisal rope, which has made Yucatan a State of millionaire planters, will be extensively developed along the west coast and will doubtless have an important effect.

In timber, that along the coast is chiefly what we would call rare woods—mahogany, ebony, Spanish cedar, various fine oaks, logwood, etc.—most of them so heavy that floating in streams is out of the question and transportation by any other means difficult. The pine on the western sierras is so far up and surrounded by such deep barrancas that it will require a balloon line to get it out.

In mineral wealth Sinaloa is not what outsiders generally suppose. Gelogically it may be doubted if the steep west slopes of the Sierras have not suffered too much from erosion to give profitable deep mines, and so far as explorations have proceeded, veins are generally narrow. Geographically the mines are still far back from the railway, which is to traverse the coastal plains. It will be several days' hard journey from the road to and out of most of the districts. Topographically most mines are in barrancas or great cañons, rising frequently almost vertically many thousands of feet, where a hard day's mule ride will advance the traveler but a few miles. These cañons rise from comparatively near sea level to the high levels of the sierras. There are, near the corner of Sonora, Sinaloa and Chihuahua, barrancas rising practically straight up 7500 ft., one especially, the Barranca de Cobre, being magnificent and terrible in its grandeur.

Developmentally, western Mexican mines are notoriously bad. While the work underground may not be unsafe gophering, as it certainly is occasionally, it is rare to have development more than a few months ahead of stoping, while prices asked for old properties are not based on what is in sight or can be brought there in a reasonable time, but on an indefinite continuation of present profits, capitalized at some low interest rate. If a mine has been a profitable producer for, say, 200 years, like Guadaloupe de los Reyes, there exists in the Mexican mind no reason for doubting that it may so continue another such period, though there may be not more than two or three years' development ahead. Guadaloupe is by far the largest and is one of the very few large producers in the State; it has a 30-stamp mill, tube mill and cyanide plant. Its ore is chiefly silver, carries some gold, and is hand-picked. Its earnings are about $100,000 per year. Sinaloa is by no means thoroughly prospected and doubtless time will reveal many properties that will be highly profitable. My remarks as to mining conditions are general, and are subject to exceptions. As to most of the districts of the west coast, it is safe to say that an ore must carry from $50 to $60 per metric ton to be worth considering.

Prices and Accommodations in Sinaloa

The traveler through Sinaloa will be interested to note the variations in price for all articles and for accommodations. Costs of everything will increase directly in proportion to the acquaintance of the native with "Gringoes" or Americans. An *almood* of mais will cost twice as much near Culiacan as at Chacala, for instance, and *zacate,* or bundle of dry corn fodder, will be 10c. in one place and 5 or 6c. at some neighboring *pueblocito* not frequented by the occasional stranger. There are not a few places in the hills where it is impossible to get *mais* or *zacate* for one's mules or *tortillas* and *frijoles* for oneself. In such times of drought as recently occurred, it is impossible to get water without payment, and scarcely then. One traveling through the interior of the west coast will do well to carry sufficient provisions for his party, depending on the country for occasional additions, and not to depend on the country for his entire diet. He will not only save his stomach and temper, but also much time. With his own little Khotal oil burner or alcohol cooker, he can get a meal at any time of the night, and so start out in the cool of the morning, or ride all night, stopping at any waterhole.

It is well enough to remember that the natives have lived in the region for some time, and for this reason know how to get along; therefore, the foreigner who persists in working or riding through the heat of the day, while the inhabitants are resting in the shade of their *ramadas,* is not only foolish, but subjects himself to *calentura* and many other dangerous illnesses. Many of the civil engineering parties working on location for the Southern Pacific are learning this by serious and costly experience. Ride at night when possible, always in the cool of the early daylight, and lie by, especially in the hot season, from, say, 11 o'clock in the morning until 4 in the afternoon. That should be a rule.

Except in the rainy season, which officially begins on the day of St. John the Baptist, June 24, there is little need of tent or slicker, and either is a useless weight. A good folding cot with blankets enough rolled in a dust-proof tarpaulin, are ample. It is not wise, nor is it usual, for the traveler to sleep inside the houses which are ordinarily built, in the western interior, of wattles and mud and roofed with palm thatch. The newcomer will doubtless be somewhat astonished for a while at the size and curiosity of the audiences of native ladies and gentlemen who will assemble in each little pueblo as he makes ready for retiring or dresses in the morning light. The same joyous and appreciative curiosity is expressed when he cooks a meal.

Automatic Acetylene Generator for Chemical Laboratories

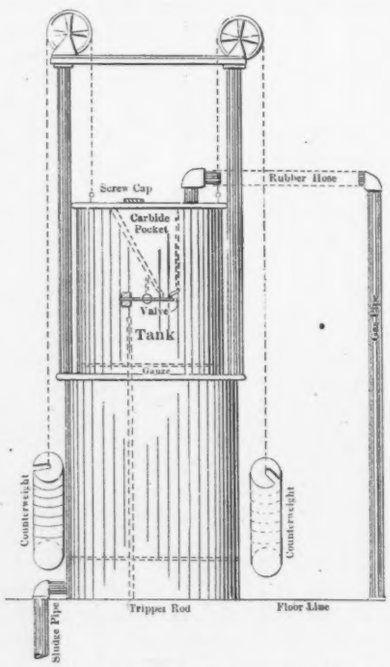
By Randolph Bolling*

The acetylene gas generator described in this article is one which I recently designed and built, especially for chemical-laboratory requirements. Bearing in mind the published reports of tests applied to some of the acetylene generators now on the market, my attention was especially directed to the poor chemical design of some of them. The inventors had produced machines that were automatic in their action, but were extremely low in their efficiency, consuming a large amount of calcium carbide to produce a relatively small amount of pure acetylene. Briefly reviewing the faults, it is necessary to draw attention to the main defect, which is that of allowing the carbide to come in contact with an insufficient volume of water in the reaction chamber, thereby causing the chemical reactions to proceed with the evolution of heat and consequent breaking up of some of the carbide into other gases of the hydrocarbon series, which are low in illuminating power. This is a very serious drawback to some of the smaller sizes of generators and its ultimate result is the reduction of the yield of gas, and also of heat units per cubic foot of gas, so that the generators do not develop anywhere near the theoretical volume of gas. Most of these machines appear to have been designed more from a mechanical standpoint than from a chemical one, with the ultimate result of large carbide consumption. From a scientific point of view the only proper way to obtain the maximum output from a given weight of calcium carbide is to provide an apparatus which can be so operated that a small quantity of calcium carbide is brought in contact with a large volume of water, so that the heat of the chemical reaction can be absorbed in a very large volume of water; the gas thus obtained is pure acetylene containing about 98 per cent. C_2H_2.

The Bolling Generator

The general design as shown in the drawing contains some original features. The first that may be mentioned is the automatic appliances for maintaining a constant evolution of gas from the apparatus without any personal manipulation. The generator consists of two heavy galvanized-iron tanks, one of which telescopes within the other, the lower tank having a heavy cast-iron ring at the rim, on which are screwed two upright pieces of iron pipe; these are joined at the top by a flat iron bar, with brackets for pulleys, which also carry counterweights. The upper tank has soldered into its top a pocket of galvanized iron for holding calcium carbide, and is filled from an opening in the cover closed by a screw cap. The bottom of the pocket terminates in a chute which is closed by a flap-valve. The lever carrying the rubber flap has a counterweight attached, to balance the weight of the flap closing the carbide chute. Near the bottom of the upper tank is soldered a piece of 16-mesh iron-wire gauze, the function of which is to retain all carbide which falls from the pocket above under the surface of the water for about 4 in., thereby allowing a large volume of water to react on it, and allowing the calcium hydroxide formed to slip through the meshes of the gauze to the bottom of the lower tank, where it can be removed from time to time by blowing off from the sludge pipe.

To charge the generator, the cap is unscrewed on the carbide pocket and filled



BOLLING ACETYLENE GAS GENERATOR

with small lumps of calcium carbide, the lower tank is filled with clean water up to the top, and then the upper tank is placed in position, the counter-wire ropes or cords attached, and the weights so adjusted that the requisite pressure on the gas-distributing pipes is secured. In the meanwhile the terminal of the tripper-rod is attached by a hook to the balanced carbide valve, thus dropping a few pieces of carbide on the wire screen; an evolution of gas proceeds instantly, which gradually fills the upper tank and so raises it almost out of the lower one. The gas valve on the distributing pipe is now opened and the mixture of gas and air that is in the upper tank is allowed to escape. This is necessary in order to get rid of any air which may be in the tank and connections, and so avoid having an explosive mixture of gas and air. After the upper tank settles in the lower and more carbide is dropped, the generator may be considered in a position to do business and will operate automatically until its charge of carbide is exhausted. The flexible rubber-hose connection between the upper tank and the gas main is made of sufficient length to allow a perfectly free movement of telescoping.

Advantages of This Generator

The generator is exceedingly simple in its construction and has few parts, but it also combines the best arrangement for securing the highest yield of pure acetylene gas, and provides an abundant supply of gas at all times.

Another important feature is the preservation of the carbide in a moisture-proof chamber; this is of the utmost importance, because carbide has a decided tendency to absorb moisture and so give off acetylene even when the generator is not in action. This of course would lead to a decided waste of material. The action of the water on the carbide on the wire screen at the top of the column allows fresh water to be in contact, which is the best arrangement possible. The attachment of a dessicating and purifying train is unnecessary with this apparatus, and I have found the gas entirely free from phosphine and sulphureted hydrogen.

Now that calcium carbide can be produced and sold at a very reasonable price, I see no reason why it should not replace the gasolene generator, which has for a long time been the source of gas in laboratories situated in isolated districts. It is safe to transport, and, being a solid, does not leak or waste, as is the case when gasolene is shipped long distances. With proper burners a most satisfactory heat is obtained for chemical-laboratory operations.

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Asphalt in Turkey

Acording to the *Montan-Zeit.* (Aug. 1, 1907) the asphalt mines of Selenitza were in regular operation during the whole of 1906. The production for the year was 6000 metric tons, of which 4800 tons were exported. The capacity of the mine will be much increased by the extension of the tramways and the erection of new refining furnaces. About 320 men are employed, all of whom, including the minor officials, are natives. The manager is French. Wages are low but the cost of production is nevertheless high, on account of the lack of easy means of transportation. In order to transport material to the harbor the company is obliged to employ numerous pack-trains, which are extremely expensive on account of the high price of fodder and the short life of the animals.

In order to prevent the waste occasioned by hewing ties, a prominent railroad has recently specified that its new ties must be sawed.

A New Development in Air Compressors

A Machine That at Constant Speed Automatically Varies the Volume of Air Delivered to Meet the Constantly Fluctuating Demand

BY FREDERICK A. HALSEY†

The driving of air compressors by electric motors has introduced a new problem into air compressor design. A fundamental feature of air compressor service is that the consumption of air is variable between wide limits, and the delivery of the air by the compressor must meet this condition—a substantially constant pressure being maintained while the volume of air delivered is such as to maintain this constant pressure under a constantly fluctuating consumption. With compressors having independent steam engines the requirements are naturally and usually met by varying the speed of the compressor, but with motor-driven machines this method of regulation becomes impracticable and other expedients must be resorted to, among such expedients being the use of unloading devices by which the action of the compressor is entirely suspended from time to time, and the more recent device of throttling the suction of the machine. Motor-driven compressors are now called for in considerable numbers and of large sizes, and the problem is of growing importance. The machines here shown were made by the Nordberg Manufacturing Company, the one shown in the half-tone being for the Aktiebolget Maskiniffar, Sweden, while the one from which the indicator cards were taken was made for the North Butte Mining Company. This latter machine has cylinders of 22 and 36x42 in. and a normal capacity of 3500 cu.ft. of free air per minute.

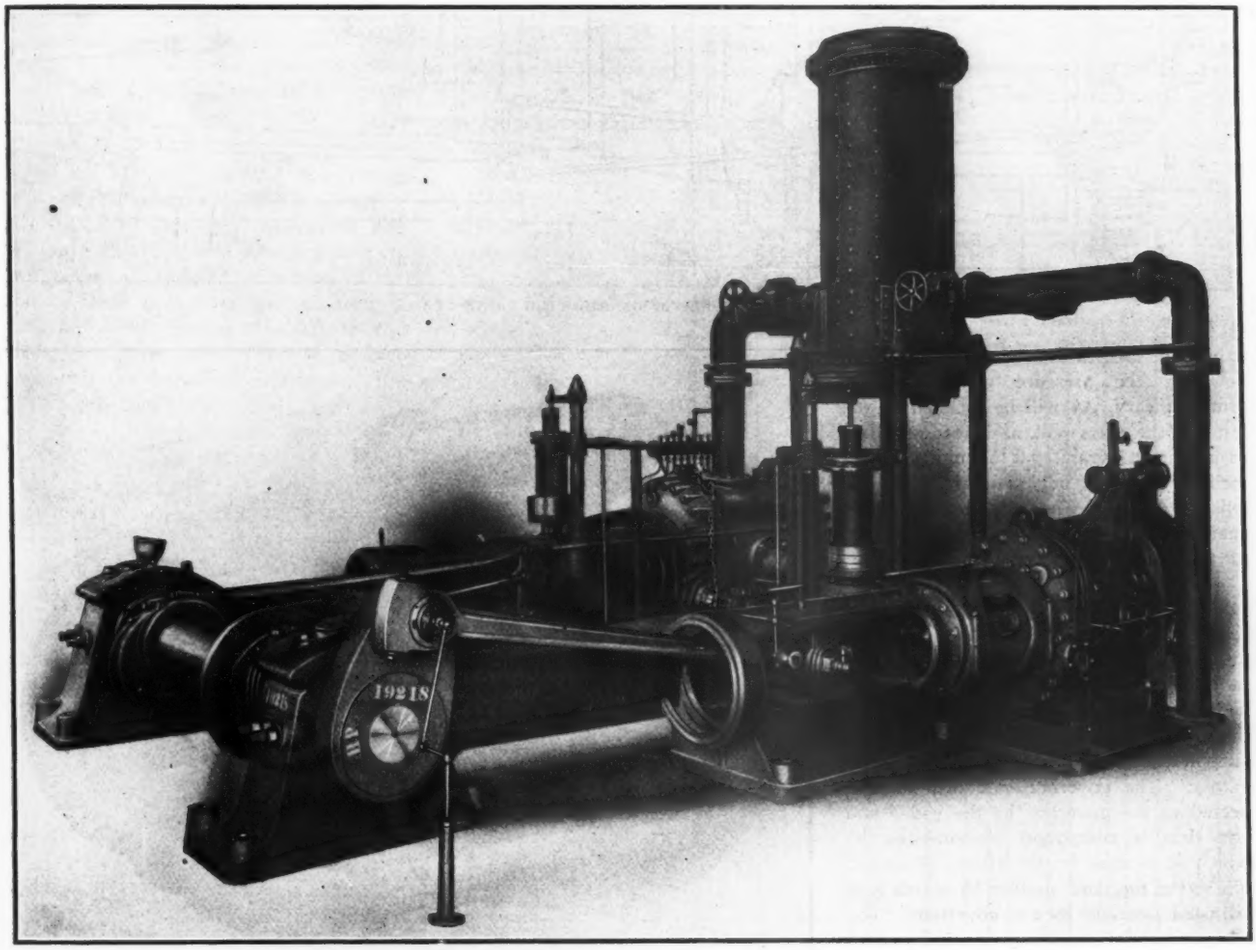


FIG. 1. THE NORDBERG CONSTANT SPEED VARIABLE DELIVERY AIR COMPRESSOR

The Principle of the Machine

The desired result is here obtained by closing the inlet valve before the stroke is completed, the air in the cylinder being then expanded below atmospheric pressure during the remainder of the stroke and compressed again during the return or compression stroke, the result being, in effect, to vary the working length of the stroke as required, the delivery of air being varied in the same ratio, while, except for possible leakage of the valves and piston, no loss is involved in the process. The valves are of the Corliss pattern actuated by the regular Nordberg full stroke gear, the closing being by a dashpot, as in steam engine practice, and controlled by a pressure governor, making the machine entirely automatic.

The Valve Gear

Fig. 1 is from a photograph of the machine, taken with the machine standing on the erecting-shop floor, and shows its general appearance. Fig. 2 is a side view of one of the cylinders, taken from between the frames, and shows clearly the general construction of the

Note—From the *American Machinist*, Aug. 22, 1907.

†Editor, *American Machinist*.

valve gear. The wrist-plate is driven by the reach rod *a*, while the releasing gear is driven by the rod *b*, which oscillates the arm *c* about the fixed center *d*.

The two reach rods *e f* to the releasing cams, are connected to the three-armed rocker *g h i*, swiveled to the lower end of *c*, *i* being connected by the link *j* to the radius fork *k* to which the pressure governor *l* is connected. It is obvious that under the action of the eccentric rod the parallelogram of parts *c i j k* will oscillate as such, the arms *g h* maintaining a vertical position and giving equal movement to both knock-off cams. Should, however, the pressure governor draw arm *i* upward, *g h* will be inclined to the left and the parts will, as before, oscillate as a parallelogram, *g h* swinging in its inclined position but maintaining parallelism with itself while the two ends have again the same movement and the release of the valves is altered.

full, one-half and nearly zero load. The compressor being compounded, the cards are double in all cases, the upper one of each pair being from the low and the lower one from the high-pressure cylinder. Fig. 5 shows the action of the gear beautifully. Taking the crank end card, the suction valve opens at the beginning of the stroke at *a* and remains open until mid-stroke is reached, when at *b* the releasing gear acts and the valve is closed. From *b* to *c* the air contained in the cylinder expands until at *c*, when the end of the stroke is reached, compression begins—the expansion and compression lines being practically superimposed until atmospheric pressure is reached, when the compression proceeds in the usual manner. The action of the high-pressure valves is precisely similar, except that the expansion and re-compression of the air is from the receiver pressure instead

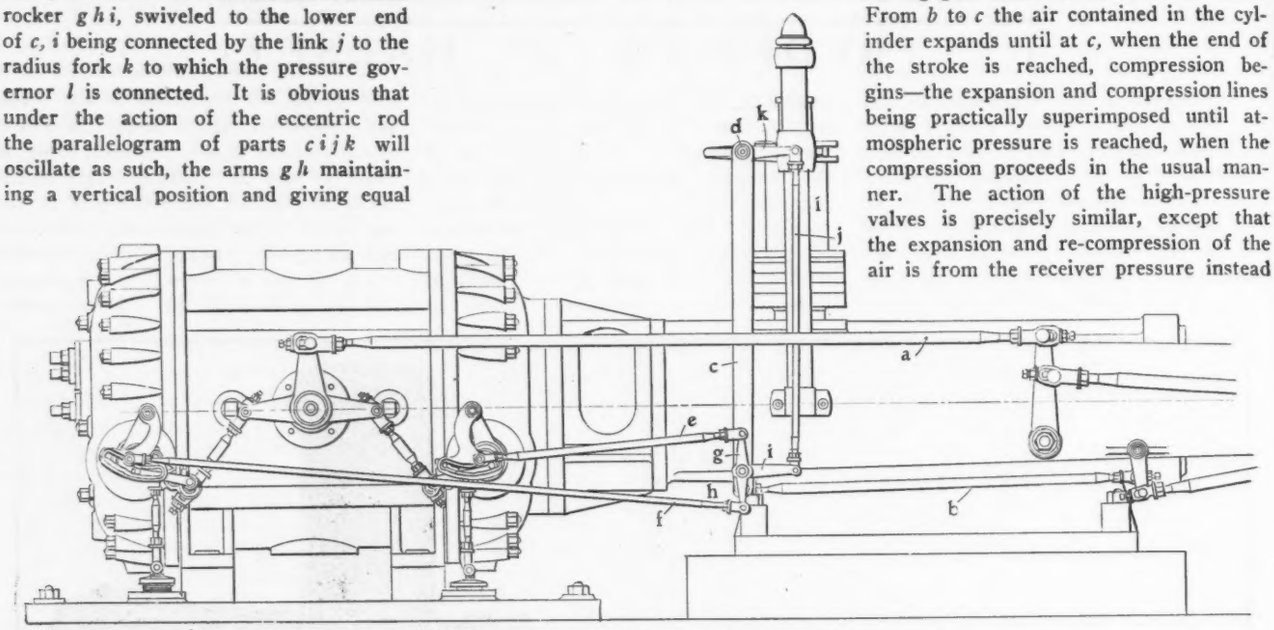


FIG. 2. SIDE ELEVATION SHOWING VALVE GEAR

The Releasing Mechanism

The releasing gear is another beautiful piece of mechanism and is clearly shown in Fig. 3. The main valve moving piece has three arms *a b* and *c*, the wrist plate link being connected to *a*, the releasing latch *d* to *b*, and the governor cam arm *e* to *c*. The governor cam arm is connected to the governor by the rod *f* and has thus a compound motion—one by which it swings bodily about its swivel pin at the top, and another by which it is adjusted laterally by the governor. The cam arm at its lower end is composed of two circular arcs struck from the center above, the two arcs being connected by a short incline. The roller at the end of arm *g*, which is keyed to the releasing latch, rides within the cam groove as arm *g* swings under the action of the main eccentric and releases and engages the latch as the roller passes the jog in the cam groove—the position of the release being determined by the governor as already explained.

Indicator Cards

The unique action of this gear is clearly shown in Figs. 4, 5 and 6 which give indicator cards under conditions of nearly

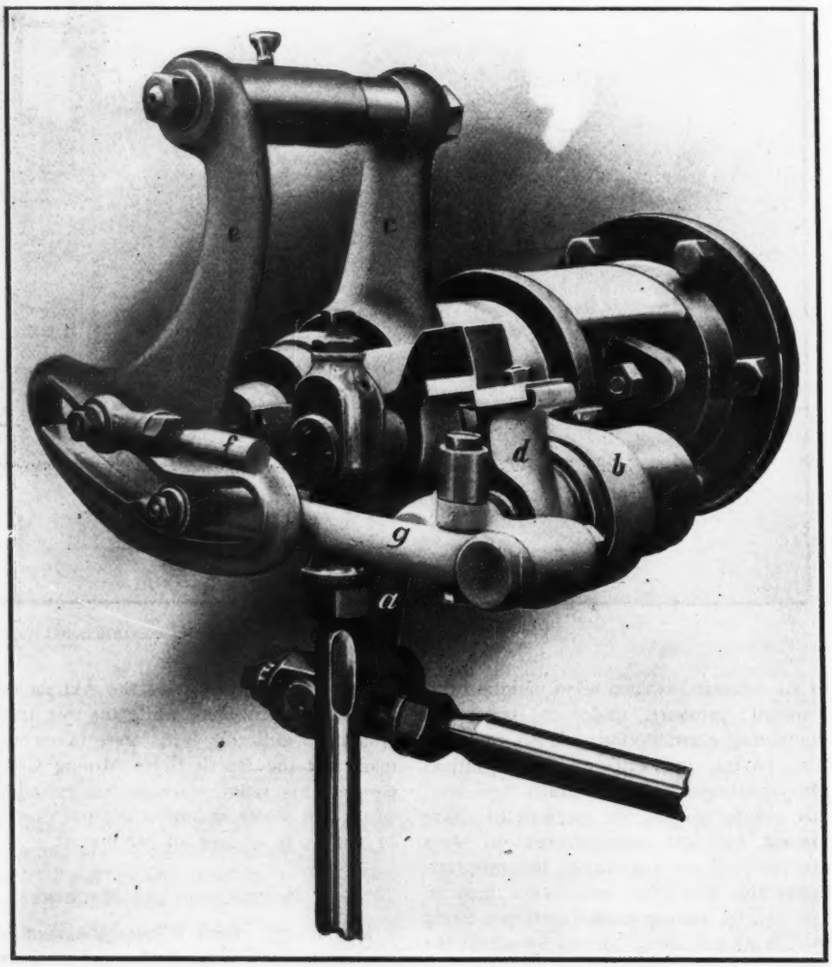


FIG. 3. THE NORDBERG FULL STROKE VALVE GEAR

of from the atmosphere. The action will be seen to be precisely the same as that of steam cylinder admission valves, opening at the end of the stroke and closing at a point determined by the governor.

In order to overcome mechanical difficulties each cylinder is provided with its own governor, and the perfection of action of these governors will be seen at once from the figures attached to the cards, giving the intercooler and receiver pressures, the extreme variation of the latter being but three pounds.

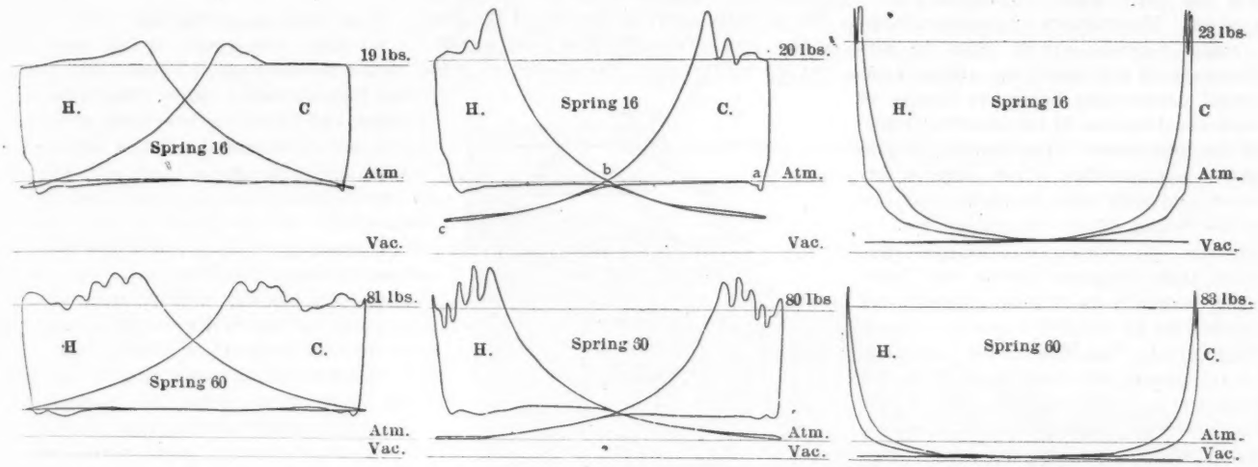


FIG. 4. NEARLY FULL LOAD FIG. 5. HALF LOAD FIG. 6. NEARLY ZERO LOAD

INDICATOR CARDS. SPEED 74 REVOLUTIONS PER MINUTE

The Valves

Fig. 7 gives a section of a cylinder head and its valve. The inlet valve is shown as open, the closing movement being by a turn to the right. When closed the port *a* opens into the main port entering the cylinder, and whatever be the pressure within the cylinder, the same pressure is maintained behind the valve, which is thus prevented from lifting from its seat which, without this provision, might be the case.

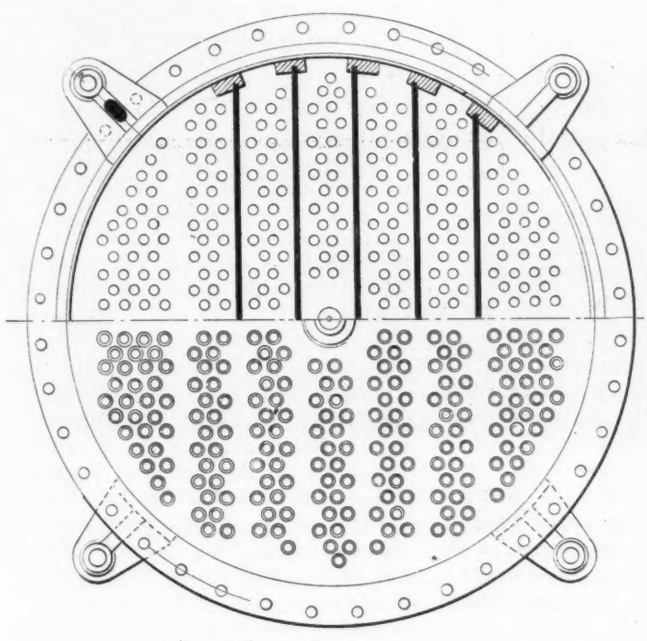


FIG. 8. PLAN SECTION

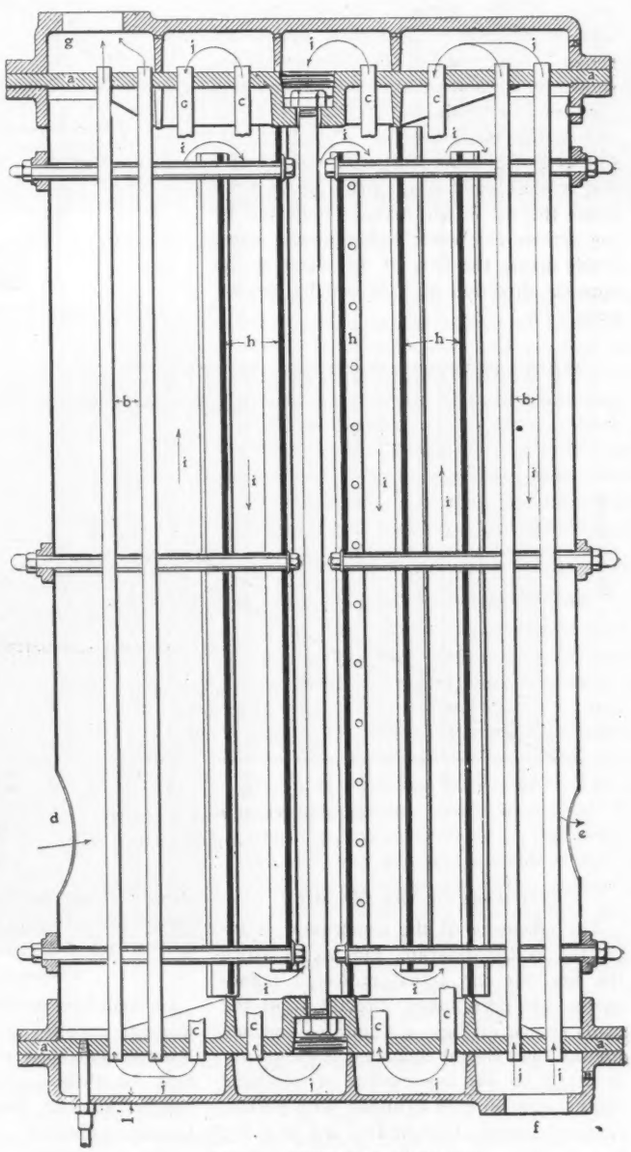


FIG. 9. SECTIONAL ELEVATION

THE NORDBERG INTERCOOLER

The Intercooler

Figs. 8 and 9 show Mr. Nordberg's latest pattern of intercooler, in which nothing has been spared to insure perfect cooling. The economy of compound compression depends entirely upon the performance of the intercooler—many compound compressors being the reverse of economical because of the imperfect action of the intercooler. The margin of gain due to compounding is not large in any event, and with some inevitable loss due to the forcing of the air through two extra sets of valves, this margin may more than disappear unless the intercooler performs its function properly, and reduces the air to very nearly its original temperature. The flow of the water and air in opposite directions through the intercooler in order that the air at exit may have the advantage of the coolest incoming water is common, but I have never before seen so complete a provision to compel the water to flow equally through all of the tubes, and thus insure that all parts of the cooling surface shall be equally effective. The tube plates are shown at *a a*, while complete tubes are shown at *b b* and others—cut off to avoid confusion—are shown at *c c*. The air enters the intercooler at *d* and is discharged at *e*, while the water enters at *f* and is discharged at *g*. Baffle plates *h h h* guide the air in the manner indicated by the arrows *i i i*, while baffles in the water heads insure the flow of the water in the opposite direction as indicated by the arrows *j j j*.

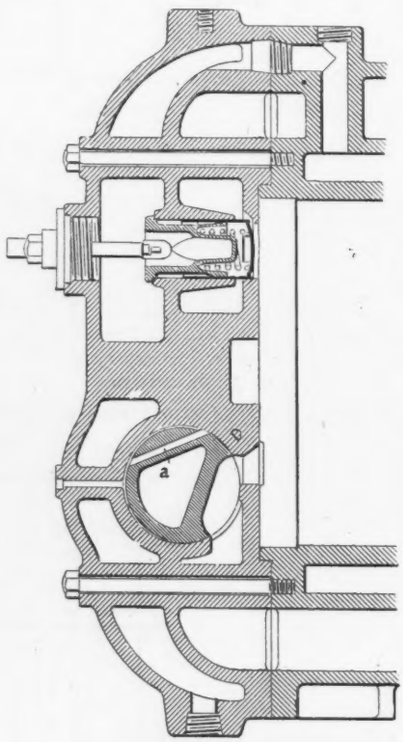


FIG. 7. THE VALVES

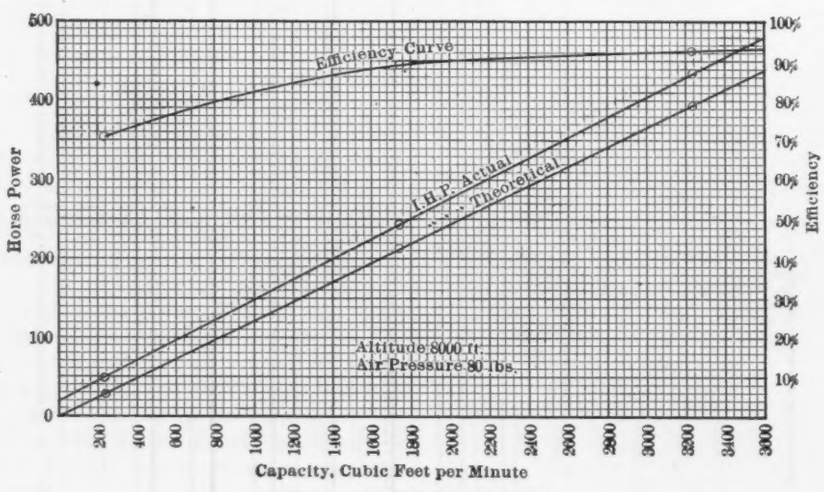


FIG. 10. EFFICIENCY DIAGRAM

Efficiency of the Machine

The efficiency of the compressor is indicated by the diagram, Fig. 10, in which the line for the actual indicated horsepower has been taken directly from the cards shown in Figs. 4, 5 and 6. The line for the theorectical indicated horse-power is based on the assumption of adiabatic compression in each cylinder, with perfect cooling between the cylinders and no valve loss—perfect intercooling being understood to mean the reduction of the air to its initial temperature when entering the low-pressure cylinder. The ratio between the two horse-powers is called the efficiency of compression and is shown in the efficiency curve at the top of the diagrams, this curve extending from an output of a little over 200 to one of 3600 cubic feet per minute. The curve will be seen to be remarkably high, and especially so for the smaller loads.

German iron masters feel the scarcity of iron-ore supplies acutely. The Rhenish-Westphalian blast furnaces import 40 per cent. of their ore from Sweden and a similar amount from the Luxembourg-Lorraine districts. The Swedish ore is mostly phosphoric, and the quality of the Lorraine ores is also disappointing.

Labor Conditions in the Brass Trade in England

New regulations relating to the conditions under which brass is cast have been issued by the English Home Office under the Factory Act of 1901. These new rules relate chiefly to the provision of proper exhaust to remove the fumes, and to the provision of means for washing the hands. The following are the new rules as issued:

1. Pouring of brass shall not be carried on unless there be:

(a) An efficient exhaust draft for the removal of the fumes at or as near as possible to the point of origin; and

(b) Efficient arrangements to prevent the fumes from entering any room in the factory in which work is carried on; and

(c) Free openings to the outside air in the upper part of the room.

2. There shall be provided and maintained in a cleanly state and in good repair, for the use of all persons employed, a lavatory, under cover, with (1) a sufficient supply of clean towels, renewed daily, and of soap and nail brushes, and (2) with either:

(a) A trough with a smooth impervious surface, fitted with a waste pipe without plug, and of such length as to allow at least 2 ft. for every five such persons, and having a constant supply of warm water from taps or jets above the trough at intervals of not more than 2 ft.; or

(b) At least one lavatory basin for every five such persons, fitted with a waste pipe and plug or placed in a trough having a waste pipe, and having either a constant supply of hot and cold water, or warm water, laid on, or—if a constant supply of heated water be not reasonably practicable—a constant supply of cold water laid on and a supply of hot water always at hand when required for use by persons employed.

3. No female shall be allowed to work, in any process whatever, in any room in which pouring of brass is carried on.

4. No person employed shall leave the premises or partake of food without carefully washing the hands.

5. No persons employed shall carry on the pouring of brass without using the apparatus provided in pursuance of Regulation 1 a.

In days gone by Frankfort-on-the-Main was the center of the German money market. Today the position is held by Berlin and Frankfort occupies a secondary place. The report of the Frankfort stock exchange, which used to be the standard authority, is now of little importance and does not appear regularly. Frankfort is still distinguished, but in other ways. It is becoming the center of advanced scientific research, and it is the seat of two of the most influential firms interested in metallurgical operations.

The Seven Devils and Snake River Districts

By George D. Reid

This copper-bearing section lies in Washington county, Idaho, and Baker county, Oregon, the Snake river running through it and forming the boundary between the two States. The first discoveries on Snake river were made some 40 years ago by placer miners. Since these early discoveries, the distance from a railway and lack of cheap transportation facilities have greatly retarded development. The Northwest Railway, long projected and at last under construction and assured of completion, will overcome this drawback. The new line will pass along Snake river from Huntington, Oregon, to Lewiston, Idaho, close to most of the mines and prospects and within 10 miles of all. This railway is being constructed by the Oregon Short Line and will eventually become the main Union Pacific outlet to Portland and Puget Sound points, avoiding as it does the present steep haul over the Blue mountains.

The Seven Devils District

The principal mines of the Seven Devils district are the Blue Jacket, Helena, Queen, Legal Tender, Alaska, Crescent, Lockwood, White Monument, Peacock, South Peacock, Arkansas and Decorah. There are also hundreds of undeveloped claims surrounding these mines. All these properties mentioned have been worked off and on for the past 20 years. The reason that they have not been worked regularly is in part due to litigation, but chiefly because of expensive transportation.

I am reliably informed that in six months the Blue Jacket mine shipped about 900 tons of ore containing high copper and moderate gold and silver values. This ore had to be hauled by wagon to Weiser, Idaho, a distance of nearly 100 miles. From there the greater part of it was shipped to New York by rail. Even under these conditions the leasers are said to have netted a profit. At Cuprum, one of the camps in the district, a small smelter was operated for some time; and at Landore, another camp, a custom smelter was operated for some time. Both these plants were closed on account of the cost of fuel and fluxes. The ore of the Seven Devils district consists chiefly of bornite, chalcopyrite and malachite, occurring in a diorite and lime formation. Garnet and epidote are two very characteristic associated minerals.

SNAKE RIVER FROM OREGON SHORE

SNAKE RIVER FROM OREGON SIDE

The new railway will be reached from the Seven Devils district by a wagon road from Cuprum to Ballard's Landing, a small settlement on the Oregon bank of Snake river. A second road is projected from Cuprum to the river down Indian creek to the new camp of Copperfield. Two aërial tramways are also projected from the mines to the railway.

The Snake River District

The Snake River district, while really a part of the same copper-bearing area as the Seven Devils section, lies along the river at a much lower altitude, and includes both sides of the Snake from Squaw creek on the north to Pine creek on the south. On account of the lower elevation, different mining conditions exist from those in the upper camps. The summers are hot and dry, and a mild winter with little snow makes all-the-year mining easy. Physical conditions make tunnel mining more practicable than in the Seven Devils, and so far no shaft mining has been attempted on the Oregon side of the river. The principal camp is at Homestead, although other settlements are fast springing up along the river from the impetus given by the coming of the railway.

The geology of this portion of the copper-bearing area is somewhat complex. Overlapping the tops of the mountains on the Oregon side are the lava rim rocks.

These rocks are characteristic of this portion of the Northwest and are a part of the Columbia river basalt flow which covers great areas in the States of Oregon and Washington. Under this basalt is the mineral-bearing formation. Originally it consisted of a number of the erup-

HOMESTEAD, OREGON, IN 1906

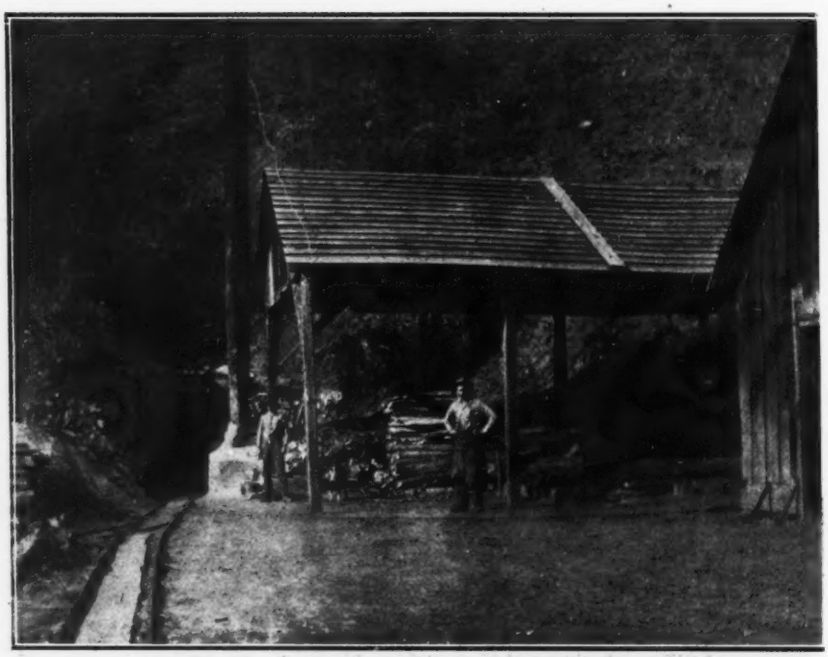
tive rocks, such as quartz porphyry, rhyolite, andesite, diabase and diorite. At least two movements of the crust seem to have taken place, shattering the original formation and forming a crushed zone or belt, extending from the Seven Devils in Idaho across the river into Oregon and under the basalt flow.

In the Seven Devils the formation has been much less altered than on the Oregon side of the river and evidence of rock movements and shattering grow more conspicuous as the basalt flow rocks are approached. In my opinion this would indicate that the shattering was directly caused by the lava outbreaks, and that it was the cause of the mineralization of the resulting stockwork. The basalt cliffs show that at least eight or nine different flows occurred and the number of layers can be easily counted by the terraces or benches they have formed.

Since these movements of the crust the crushed zone has been partially metamorphosed by the action of water and other agencies, until now it is hard to identify what the original rock mass may have been.

The ores of the district consist chiefly of chalcopyrite, pyrite, bornite and chalcocite, carrying almost always some gold and silver. Malachite and tetrahedrite are also present, the latter occurring especially at one or two properties near the river on the Idaho side.

The principal properties on the Oregon side of the river are the Iron Dike, McDougall, Farrell, Rand-McCarty and Roger-O'Toole groups, but many other claims are being developed, and considerable activity is manifest throughout the whole district. Among those on the Idaho side may be mentioned the Lime Peak, River Queen, Azurite, Chipman and McCarty groups.



ENTRANCE, NO. 3 TUNNEL, IRON DIKE MINE

Water Power

The Idaho-Oregon Light and Power Company is at present engaged in the construction of a dam across Snake river in the southern part of the district at Ox Bow. It is the intention to carry the waters of the river through three parallel tunnels, the river here making such a sharp bend as practically to parallel its own course for about two miles. A large power-generating plant will be installed at the outlet of these tunnels to furnish light and power for many towns and mines in eastern Oregon and western Idaho, and the completion and operation of this plant will be of great value to the district by furnishing cheap power to the mines that require it.

Considerable capital has lately become interested in the district. There is something of a boom going on, but so far there seems to have been little wildcatting or undue inflation of values. The next year or two should see a number of mines added to the list of producers.

A description of a rapid ore-car unloader is given by the *Eng. Record* (July 3, 1907). The device has been installed on the Duluth ore docks of the Duluth, Missabe & Northern Railroad to replace manual labor in breaking up or dislodging the ore in bottom-dumping ore cars when discharging into storage pockets. A traveling crane spans the unloading tracks above the pockets, the cross-traveling trolley of which carries vertically adjustable racks of blades which may be forced down into the load of ore in a car with a pressure of eight tons. Then by the longitudinal movement of the bridge the blades may act as a sweep to clear the car of contents from either end to the hopper. All three movements of the crane are electrically operated, so that the blades may be rapidly spotted over any car on any of the unloading tracks.

Production of Arizona Mines

SPECIAL CORRESPONDENCE

The mining companies of Arizona are taxed this year under a new law, some provisions of which have been heretofore referred to in the JOURNAL. This law provides that every mining company whose gross production in any one year is of a value of $3750, or more, must submit to the Territorial auditor and county assessor a statement of the products for a basis of assessment, it being further provided that the assessed valuation of a productive mine shall be one-fourth of its gross product in the year.

It became necessary, therefore, for the auditor to compile a statement of the gross product of all the mines in Arizona in order to arrive at the total mine-tax roll. The statement shows the names and locations of the principal companies, their gross products in copper, gold and silver, and the gross valuation of all. In some cases the latter item includes returns from baser metals, which, however, in most cases are negligible in amount and value. The smaller producers have been grouped under miscellaneous under each county. The accompanying table is compiled from the returns for 1906 made to the auditor.

There are productive mines in 11 of the 13 counties of Arizona. There are 62 companies in the Territory which come into the "productive" class under the law. It is certain that the gross valuation for the Territory of all products of mines, $53,801,781, representing sworn returns of all the companies, is very close to the actual product, if indeed it is not actually correct.

The average valuation for 1906 of the various products, as figured in the schedule, is as follows: Copper, 19.278c. per lb.; silver, 66.791c. per ounce; gold $20.67 per ounce.

GROSS PRODUCT OF THE MINES OF ARIZONA FOR THE YEAR 1906.

COUNTY.		COMPANIES.	LOCATION.	COPPER, LB.	GOLD, OUNCES.	SILVER, OUNCES.	VALUE PRODUCT.
Cochise	1	Copper Queen Consolidated	Bisbee.	71,711,813	7,573	382,211	$14,236,428
	2	Calumet & Arizona	"	36,934,387	4,241	194,451	7,337,748
	3	Superior & Pittsburg	"	9,044,875	143	32,564	1,768,377
	4	Shattuck Arizona	"	2,541,680	.....	.....	489,985
	5	Tombstone Consolidated Mines	Tombstone	.....	7,043	577,221	650,218
	6	Two companies, no returns, assessed full value	.....	.....	.....	.....	17,500
	7	Miscellaneous, four companies	.....	917,242	4,923	456,431	583,410
Coconino	8	Canyon Copper	Grandview	26,798	.....	324	5,383
Gila	9	Old Dominion Copper	Globe.	16,602,186	1,798	74,123	3,286,125
	10	United Globe	"	4,607,537	.....	5,277	891,772
	11	Saddle Mountain Mining	Christmas.	2,338,492	437	16,410	470,515
	12	Live Oak	Globe.	1,714,074	.....	.....	330,439
	13	Gibson Copper	"	1,106,100	.....	.....	213,234
	14	Arizona Commercial Copper	"	939,102	.....	.....	181,040
	15	Miscellaneous, three compan's	"	1,592,343	.....	.....	305,972
Graham	16	Arizona Copper	Clifton.	25,937,006	.....	.....	4,973,421
	17	Detroit Copper	Morenci.	19,588,412	70	2,407	3,762,671
	18	Shannon Copper	Clifton.	9,592,773	698	23,340	1,868,963
	19	New England & Clifton	Clifton.	1,140,770	43	10,472	228,508
	20	Miscellaneous, five companies	.....	698,013	.....	24,744	150,130
Mario'pa	21	Relief Gold	.....	.....	738	.....	14,778
Mohave	22	Gold Road Exploration	Gold Roads	.....	26,299	12,013	551,629
	23	Miscellaneous, four companies	.....	27,653	1,346	40,605	90,081
Pima	24	Imperial Copper	Silver Bell.	4,385,246	.....	44,327	874,994
	25	Twin Buttes Mining	.....	700,329	.....	11,294	142,553
	26	Helvetia Copper	.....	379,823	28	3,898	76,446
	27	Tip Top Copper	Tip Top.	298,890	.....	.....	57,620
	28	Miscellaneous, two companies	.....	151,000	.....	414	29,466
Santa C.	29	Miscellaneous, two companies	.....	46,136	16	73,373	133,684
Yavapai	30	United Verde Copper	Jerome.	38,827,365	12,913	428,317	8,038,126
	31	Ideal Mining & Development	McCabe.	518,895	14,696	139,766	497,152
	32	De Soto Mining	Humboldt.	1,128,327	903	19,259	249,047
	33	Congress Consolidated	Congress.	.....	10,410	11,407	222,794
	34	Commercial Mining	Prescott.	694,126	.....	.....	131,114
	35	Miscellaneous, twelve compa's	.....	820,762	17,055	117,004	655,866
Yuma	36	King of Arizona	Kofa.	.....	13,643	4,395	284,593
		Totals, sixty-two companies	.....	255,012,155	125,016	2,704,045	$53,801,781

Loss of Heat Due to Boiler Scale

BY L. P. BRECKENRIDGE

The engineering experiment station of the University of Illinois has issued Bulletin No. 11, "The Effect of Scale on the Transmission of Heat through Locomotive Boiler Tubes," by Edward C. Schmidt and John M. Snodgrass. This bulletin describes a series of experiments begun in 1900 to determine the relation of the heat loss due to scale to the scale thickness. The experiments comprise tests on single tubes as well as tests of the entire locomotive boiler. The results of all the tests, plotted with reference to scale thickness, show great divergence in the heat loss, which is ascribed to differences in scale structure.

The conclusions derived from the tests are summarized as follows:

1. That for scale of thicknesses up to ⅛ in., the heat loss may vary in individual cases from insignificant amounts to as much as 10 or 12 per cent.

2. That the heat loss does increase with thickness in an undetermined ratio.

3. That mechanical structure of the scale is of as much or more importance than thickness in producing this loss.

4. That chemical composition, except in so far as it affects the structure of the scale, has no direct influence on heat transmission.

Non-metallic Minerals in the Philippines*

BY WARREN D. SMITH†

Coal is the most important non-metallic mineral occurring in the Philippines. It is found in practically every island of the group and in many cases is associated with petroleum. The quality of the coal is pretty regular throughout the archipelago; it is a sub-bituminous coal having the appearance and specific gravity of lignite, but the carbon content and the streak of bituminous coal. The more promising fields at the present time are as follows: Cebu, in the region behind the towns of Compostela and Danao; the island of Polillo, which is on the east coast of Luzon about opposite Manila; the southern portion of the island of Mindoro in the vicinity of Bulalacao; Bantan island, about 12 miles northeast of Legaspi in Albay province; the northern portion of Dinagat island, just north of Surigao, Mindanao; and near Escalante in the northeast corner of the island of Negros.

These coals have stood up fairly well in tests under stationary and marine boilers, but they are not entirely satisfactory. Apparatus is now being erected under the joint supervision of the Department of Chemistry and the Bureau of Science to test the merits of these coals in gas producers.

Small amounts of petroleum have been discovered in three localities; in Tayabas province on the east coast and Cebu province on the west coast near Toledo and Algeria. It is stated in connection with these deposits that there is only one concern in the islands which can handle oil, and that it is not willing to go out of its way to look into a proposition which does not offer large returns. If, however, someone were to develop these properties and establish several good wells, the company might then take hold of them.

Of other minor minerals it appears that the present knowledge of their extent and possibilities is rather vague. Materials for making portland cement are very fair in quality and the limestone and shale beds are near each other. Gypsum deposits are known but are not very near the raw materials for the cement. No beds of natural cement are known. Deposits of phosphate rock, asbestos and manganese ore have been located but practically no exploitation of them has been undertaken as yet.

Superphosphate works have been erected on Hikoshima island, near Shimoneseki, Japan, and phosphate rock is imported from Christmas Island. The amount so imported from August 26, 1906, until the end of the year was 5459 tons.

*Abstract from the *Far Eastern Review*, June, 1907.

†Government geologist.

Setting Timber in Anthracite Coal Mines

Reasons Why It Would Be Impracticable to Have a Special Timber Corps Instead of Having the Props Placed by the Miners

BY JOHN H. HAERTTER*

The timbering of a mine in a thorough manner is an important factor in safe mining and in the amount of coal won without the destruction of the pillars and the consequent caving of certain portions of the workings.

It is pleasing to note that mining journals are endeavoring to keep pace with modern methods of mining whereby the mining man can keep in touch with subjects covering the conditions of the present time. The JOURNAL of June 15, 1907, in its editorial on "Some of the Present Problems in Coal Mining" presents for discussion nine subjects of much interest to the mining industry, the sixth of which prompted me to express my views. They are here stated because of the interest taken in the subject on different occasions, and for the purpose of obtaining the views of others.

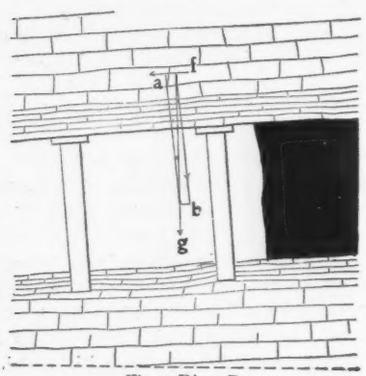


Fig. 1 Dip 3 Deg.

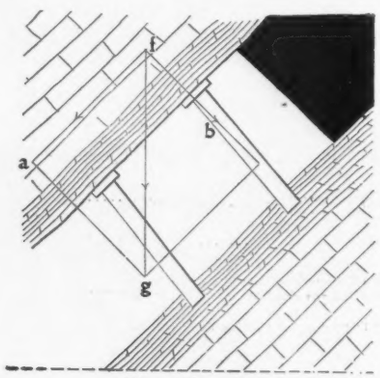


Fig. 2 Dip 45 Deg.

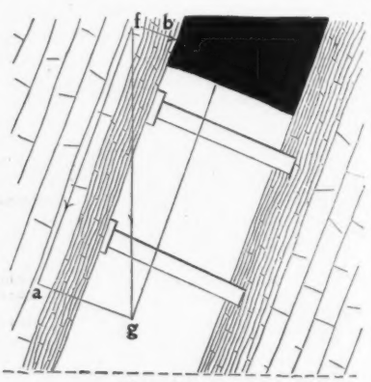


Fig. 3 Dip 70 Deg.

SETTING OF MINE TIMBERS

I assume that the question is raised by reason of so many accidents recorded yearly resulting from a fall of roof, in many instances caused by improper timbering on the part of the miner, who is either careless or incompetent. However, the question could not be satisfactorily solved without considering the other conditions connected with it and I have consequently treated it in a general way.

The question asked, in its published form, reads: "Is it the better plan to have the miners set their own props, or to employ a corps of experienced men to set props?"

The question undoubtedly applies to the timbering of working places in general, and not strictly to the setting of props only; considered in this light I have, in many cases, used the word "timbering," meaning the rendering safe of a working place in general.

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The methods for setting props and all timber, and the number and size of the sticks required are determined by the locality, and such conditions as the thickness of the seam, the character of roof and floor, the width of opening and the depth of mining below the surface.

LOCALITY.

As to locality, a vast difference exists between the Wyoming region or upper field and the Lehigh and Schuylkill regions, or middle and lower fields respectively, not only in the timbering of the working places but in many other ways. In the upper field the seams lie in an almost horizontal position while in the middle and lower fields they vary from horizontal to vertical, averaging about a 45 deg. pitch. They are horizontal or nearly so only when they approach the anticlinal or synclinal axis or when swinging around the nose of an anticlinal from a north to a south dip and *vice versa*.. Consequently in the lower fields the methods for timbering exceed greatly in number those of the upper field. In addition to the various standard methods for timbering in the lower field the foreman or miner is frequently confronted with the squeezing of extensive portions, treacherous roof, running of pillars and other conditions which not only require prompt action, but also demand great care and judgment on the part of the men selected to do the relief work. A squeeze in the Wyoming region is entirely different from one in the lower fields. In the former we find the overlying strata coming down vertically in one solid mass, crushing the pillars, and it is generally advantageous to extract enough pillars to give the mass a loose end to check its spread over a large territory and thus confine it to one of smaller extent. When this is not done, the only other means at hand is heavy timbering or cogs, the latter being used quite extensively and with success. In the lower field the squeeze extends down the pitch and the crushing of the pillars, if only to a small degree, causes the pillar to slide and the entire moving mass slides down the pitch crushing everything before it as far as the openings extend. The methods for timbering to check its progress must be the best to suit the occasion and produce the desired effect.

METHODS OF TIMBERING

The tendency of the roof is to fall in the direction of the force of gravity as the line *f g*, Figs. 1, 2, 3. This force, however, is resolved into two forces where the roof is solid and has a tendency to hold together as shown by the line *a f* parallel to the dip of the seam and the line *b f* at right angles to the dip. The line *a f* is equalized by the opposing force existing in the roof itself and the only force or pressure to be provided against is that represented by *b f;* and since the resisting force of the floor is at right angles to the dip, it is self evident that the most effectual position for posts or props for supporting the roof is at right angles to the dip.

From the figures it is clear that the greater the inclination of the seam the less is the weight on the props. The props are, in practice, slightly inclined up the pitch—or underset as it is termed—so that the least settling or sliding of the roof will tighten them. It will also be noticed that the greater the inclination the greater is the tendency to slide. Fig. 1 shows the method of support in a flat seam as in the Wyoming region, while Figs. 2 and 3 apply to the Lehigh and Schuylkill re-

gions, except that the caps are seldom used in breast work in the latter fields, the head of the post simply being driven into a hitch cut in the roof. These conditions are of importance in the plans for the extraction of the coal and the timbering of the place.

The question at issue in its stated form applies to the three fields and must therefore, be answered in a manner that will meet the conditions in all.

The Miner Knows Dangerous Conditions Best

First of all, it is a fact that the miner himself, aside from the foreman or fireboss, knows the conditions of his working place best, laying aside the fact that many miners of roaming nature only work in one place for several days and then go to another, not remaining long enough to study the conditions, which is also true of men employed to do company work, including those hired as timbermen. The average miner knows the nature of the working face at all times, more particularly that of the roof, for the reason that he is constantly taking heed and studying its actions for his own safety. Some of the seams carry a good roof throughout and a few props over a big area will often prove sufficient; others carry a roof of variable nature which is constantly changing, frequently in a short distance; while still others carry a roof which is always treacherous. Whom could we expect in the two last cases to know the conditions better or to be more careful than the miner himself in timbering his place properly, for the reason that he would place his own life in jeopardy were he to do it in a reckless manner? Furthermore, no one aside from a cautious foreman will be as well acquainted with the conditions which cause a sudden fall of roof without previous warning, as frequently occurs in the third case just mentioned.

A Large Corps of Timbermen Would Be Necessary

We admit that a corps selected from a number of experienced miners could in many cases stand the timber in a more workmanlike manner and better results might be obtained in the way of accidents, falls and delays in transportation. However, some plan would have to be adopted whereby a required number of the corps could be kept within the immediate vicinity of the working faces, and from the extensive limit to which some of the workings in present-day mining reach, we would be compelled either to carry a large corps of timbermen, in addition to the present company force, in order that they would be on hand at the proper time, or allow a working place to stand idle awaiting the arrival of one or two of the corps from a remote corner of the mine after some time had already elapsed in getting word to them, and we can readily see the amount of time which would be wasted day after day. The mine foreman of today has trouble enough now to watch and keep busily engaged the company hands required to transport the coal from the working faces to the surface besides the attention and duties required of him to fulfill the mine laws as well as

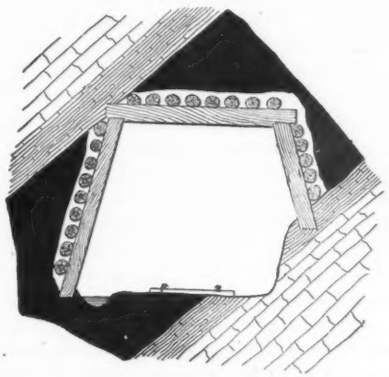

FIG. 4. SETS SPACED 5 TO 7 FT. C. TO C.

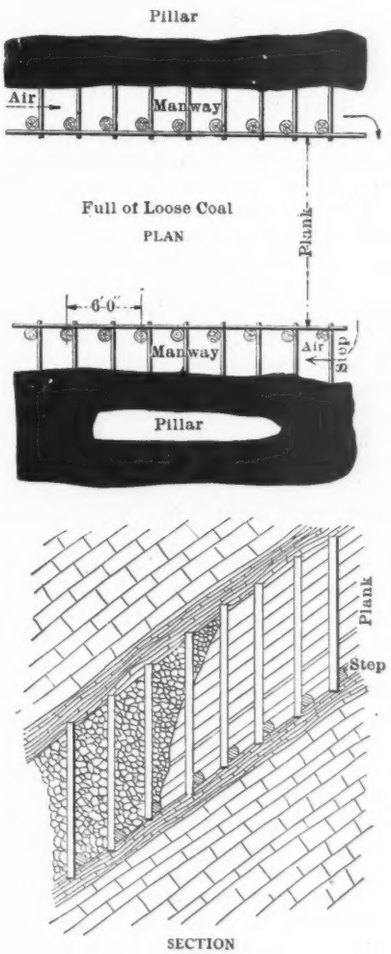

FIG. 5

the rules of the company he is serving. The officials in charge from the early days to the present time have been well acquainted with the fact that company hands, unless closely and continually guarded, will not render a full day's service. We are led to believe that the same thing would be true in the case of the timber corps, especially if their work were scattered throughout different portions of the mine when a foreman or his assistant could not have them under their eye. A good example is furnished by assuming that a portion of the roof in a chamber of one part of the mine has fallen and there is still hanging another piece which might be secured by immediate propping. The miner having received orders to do no more timbering leaves his working place and informs someone in charge of what has occurred. A messenger is despatched for the timber gang. In the meantime the rock falls, covers the roadways and, besides being dangerous, is idle until the fall is cleared away. Had the miner been the proper person to dress the roof or secure it with timbers, he would have taken immediate steps to do so and, even granting that he might not have been able to keep up the rock, the time lost would have been taken advantage of and the delay made shorter.

Discrimination by the Men

In the event of a corps having been organized for timbering purposes we would doubtless find that certain members of it would soon be on disagreeable terms with the miners for various reasons. Again partiality would be shown in timbering a friend's working place in preference to another who, through prejudice, would be compelled to wait though in point of turn the latter should be first. The natural result would be dissatisfaction among the workmen, and a consequent delay in the work in general.

Many miners have an off-day immediately following pay-day or during a holiday season. If the miner fails to report for work and the timber gang is laid idle on that account, it is only necessary for them to return home unless the mine foreman has other duties for them to perform. On the contrary if the miner reports for work and the timberman does not, then the miner can only blow the day's coal for he is not allowed to proceed further until the place is timbered. The point is this, in the first case matters will be as they are now, but in the latter the delay in working the place and the loss in tonnage is increased. These occurrences would be frequent as experience has often proven.

In general the setting of props or posts to support the roof in the upper field is the same for chambers as for roads and very little double timbering is done in comparison to that in the lower fields where a set of two legs and a collar constitutes the timbering of the gangway or road for its entire length (Fig. 4), and where the props in the chambers serve as the uprights against which a plank is placed to hold the refuse or coal as the case may be; the outside of the wall so formed constitutes the sides of the man-

way and aircourse while the rib of the pillar forms the other side.

Practical Cases

The chambers, as already stated, are on an average dip of 45 deg. The props are spaced 3 ft. apart and the planks or slabs, 6 ft. long, are joined at every other prop and constitute what is termed a length. The chambers vary in length from 150 to 250 ft. pitch measurement, from the air course below while the thickness of the seam varies from 3 to 12 ft. Assuming a chamber to be 200 ft. long and the seam 8 ft. thick we can readily see the amount of timber required when we know that as many as 60 chambers are working at one time, not considering the amount of gangway and relief timbering constantly being put in. Fig. 5 shows a chamber, like this, in plan and section. The progress made per day, on an average, is about one length or 6 ft. of coal extracted with the necessary timber, dependent entirely on the thickness of the seam and the hardness of the coal.

No Timber Corps Probable in Lower Anthracite Fields

The suggestion to have a timber corps in the lower field will never receive much attention. In many chambers as described above, the seam is of a free nature and the pillars are found to chip and creep. It would be out of the question to have anybody excepts the miner to timber such a place for it must frequently be done immediately after a shot has been fired in order to secure the place and prevent its closing. On numerous occasions the fire boss on his morning round has found manways blocked tight and only the miner who knows every foot of ground is permitted to enter the place to open it and put it in safe condition. It often happens that the place must be abandoned on account of its dangerous nature and we can see how absurd it would be to send into such a breast anyone strange to conditions as would be the case with a timber corps.

A New Scale of Wages Would be Necessary

Another point not to be overlooked would be the establishment of a new rate of wages for the miners after the work of timbering would no longer form a part of the duties he contracts to perform. At the present time the miner must set all timbers required to render safe the roof and ribs, together with shooting the coal and loading it into mine cars and laying the road, for all of which he is paid a lump rate per yard or per car. If we take away from him the work of standing the timber we must also reduce his rate per yard and here is where the disagreeable business dealings with the miners would commence. This applies to gangways and chambers of upper and lower fields. In the lower fields the breast miner only blows the coal and sets the timber but the amount of timbering to be done and the carriage up a chamber, dipping from 45 deg. to vertical, forms quite an item and a big reduction in the present rate per yard would naturally follow the taking away of this work from the breast miner.

There would be no end to labor and wage disputes and the nearest way to a settlement of the grievances, which would arise, would be the creation of another conciliation board or a big increase in the membership of the present one. In this connection we must remember too that under the present arrangement of compensation of the miners, a mine foreman is at all times at liberty to order a set of timber or props taken out and replaced by the miner and at the miner's expense, if the same are not set to the satisfaction of the foreman or his assistants. On the other hand timber carelessly placed by an unconcerned, disinterested company-hand would have to be taken out and replaced at the company's expense and the cost for dead work would increase.

Mine Laws Concerning Timbering

From Section 1, Article XI, of the mine laws, it is to be construed that the timbering was intended to be done by the miner for the reason, already stated, that he is the one who knows the condition of the working place. The law reads: "It shall be the duty of the owner, operator, superintendent or mine foreman of every mine to furnish to the miners all props, ties, rails, and timbers necessary for the safe mining of coal and for the protection of the lives of the workman. Such props, ties, rails, and timbers shall be suitably prepared and shall be delivered to the workmen as near to their working places as they can be conveyed in ordinary mine cars, free of charge."

Whether or not the present question presented itself at the time the law was framed, I do not know, but I do know that the law in its present form would have to be revised if the timbering of the working places is taken away from the miner and entrusted to a timber corps.

Section 2 of the same article would also apply if the present method should be changed. "Every workman in want of props, etc., shall notify the mine foreman or his assistant of the fact at least one day in advance, giving the length of the props or timber required; and in case of danger from loose roof or sides, he shall not continue to cut or load coal until the said props and timber have been properly furnished and the place made secure."

Here we are confronted with the circumstances mentioned before, that the miner would be obliged to await the arrival of the timbermen and until the place was secured.

By Section 3, same article, the company is held liable for damages arising from a failure to supply timber as required by Section 1. We can readily understand that this liability would be greatly increased. Under the present system the miner, injured through his own failure to order the timber and secure the roof and sides, has no redress. On the contrary if the timbering is to be done by a corps and a failure to set the timber at the necessary time resulted in a fall of roof and the consequent injury to the miner, notice of a suit for damages could be expected. I have only expressed my views from the anthracite standpoint. In a general way the modes of timbering can be compared to the bituminous fields as regards flat seams. However, not knowing the bituminous methods for paying the miner together with other details of importance, the question in that field is left for bituminous men to answer.

Surely the question is one of vital importance, and grows more complicated every year. Deeper mining is on the increase and while most attention is paid to the size of pillars and width of openings the question of timbering also becomes more important.

From the facts before me I am of the opinion that the miner is the proper person to set the timber, not because he is always the most capable but for the reason that he knows the exact nature of the roof overhead as well as the sides and floor forming his working place.

At any rate the best timbermen to be found in the region today are the men who have mined for years. Their years of experience have made them experts in timbering. If a corps of experienced men were selected to timber the mines we would without doubt pick them from a band of old experienced miners. Then why should we take from the miner this duty?

I have considered the question for some time and have this suggestion to offer. Since so many accidents in the mines result from falls of roof due to improper timbering or direct neglect in timbering, and since in spite of the laws, the constant instructions from competent foremen, and the efficient mine inspection service, these accidents are increasing yearly, we believe that some one person, selected for his ability as a timberman, his knowledge of the character of the coal seams and overlying strata, should be invested with authority; his specific duty would be to instruct the miner, in the placing of timber and make him obey. This would offer a better solution to the question than the employment of a corps to do all timbering. Any sensible and intelligent man so selected would at once feel the responsibility attending such work entrusted to him and I believe that good results would follow. We have the mine boss and the fire boss. Why could we not have the timber boss?

According to Kandikyn, a Russian engineer, the deposits of anthracite coal between Berdinsk and Platoff in the Upper Urals are of immense extent.

The Effect of Barometric Variation on the Outflow of Gas in Mines

By W. H. Booth

In the opinion of mine superintendents who have watched the effects of barometric variations, no doubt can exist that gas outflows are brought about by them, and undoubtedly most serious colliery disasters usually come with a heavy barometric fall. In directions other than mining, support is given to the very great influence of barometric variations. Two particular instances will be here cited. In the course of boring for water in the Wealden area of southeastern England the stratum was the Weald clay. The boring was carried unlined for considerable distances, at times ahead of the lining tubes. The matter of barometric influence on bore holes was discussed and attention called to the behavior of the clay during periods of high and low barometer.

The argument took place at the time of a public holiday of about three days' duration, and it was confidently expected that, as usual, on returning to work after so long a stoppage, the hole would be found closed in considerably. But the barometric pressure had remained high throughout the holiday, and much to the operators' surprise the line of tools passed freely to the bottom of the dry unlined clay borehole, and subsequent experience has shown that the main cause of shrinkage of the diameter of the hole was air pressure locked up in the earth during times of high barometer.

In the Wealden area of England I had a well 200 ft. deep in which to fix a pump at a depth of 100 ft. from the surface, as regards the upper barrel, the lower barrel being placed down a bore pipe which stood up 100 ft. from the well bottom, the two pumps balancing each other on opposite cranks at the surface frame, and the upper pump drawing from a tank placed 100 ft. below the surface as the delivery tank of the lower pump. The well was in the Ashdown sandstone, a peculiar Wealden stratum, in which there are numerous seams of coal. These coal seams vary from a sixty-fourth of an inch to about a sixteenth of an inch in thickness. The rock is seamed with this fine coal. It is not a Carboniferous rock, geologically speaking, but the coal is nevertheless a true bright coal and exists in fine thin sheets.

Effect of Barometric Change on Gases in a Well

When the barometer was rising the atmosphere entered the well and poured into the rock, where it acted freely on the large surface exposure of coal and a large amount of carbon dioxide was generated. As soon as the barometer changed the reverse plan was set up, and so great was the output of carbon dioxide from the mouth of the well that it extinguished a lighted candle standing several feet away. On several occasions the man engaged on the pump fixing was overcome with gas. This occurred in spite of many precautions based on the knowledge that often a candle would not burn if dropped simply below the surface stage board.

To keep the pump fitter safe he was strapped on the well-sinkers' horse or seat-board and lighted candles were placed 20 ft. above and below him. An india-rubber air-pipe, fed from the surface, was placed so as to blow directly upward upon his mouth and nostrils. An old miner kept his eye on the candles, with injunctions to have the man at once wound up if either candle went out; still, with all these precautions the man was insensible more than once. It was surprising how soon the well, which was 4 ft. in diameter, would become perfectly clear if the barometer rose ever so little, or how, on the contrary, if the barometer fell, the well would at once fill with dioxide.

The gas was manufactured from the fine coal and would accumulate several times a day, following the diurnal and subsidiary undulations of the barometer. It afforded, by reason of the production of carbon dioxide, a singular proof of the part that the whole earth plays in breathing the atmosphere. Here was a dry, freshly cut rough rock surface, about 2600 sq.ft. in area, and capable of swallowing a lot of air which had to enter by the mouth and flow down the well. It is therefore easy to understand how the quality of the air in the well could so quickly change its character.

Fan Should be Speeded When Barometer Falls

The hole had a capacity of about 2400 cu.ft., and if the barometer varied ¼ in., at any time, this variation alone represented 1/120 of the well contents, or 20 cu.ft. With the surrounding rock all porous, a small change in pressure makes a difference of 2400 cu.ft. within a very short radius of the well. In a mine where the barometer may fall an inch, this represents fully 3 per cent. of the volume of air in the mine. In other words, if the goaf is filled with gas, enormous volumes may sweep into the workings when a decrease in pressure occurs.

Considering that with an exhausting fan there is always a pull on the mine air, the speeding up of the fan will not produce any serious difference compared with the effect of barometric fall. It is therefore wise to run the fan and pull the gas out of the mine as fast as possible, for the barometric variation is of greater effect than is the slight extra speed of the fan. No ordinary human agency can cope with the expansion of the air of a mine when a heavy fall of pressure takes place. The gas will pour into the entries from both goaf and face as soon as the pressure is released. The flow of gas ceases almost as soon as the barometer stops falling, for the goaf is open and easy of access to the air and will at once establish an equilibrium of pressure. Probably the danger comes from the sudden or copious flow from the goaf and is soon over, but the steady flow of gas from the coal must be dealt with by the fan for some time. It should be a simple matter to cause a fan to vary its speed as the barometer varies.

Fuel in Russia

An article in London *Engineering* gives a summary of the Russian fuel industry. The requirements of Russia, reduced to a coal basis, amount to rather more than 26,000,000 tons per annum, of which about 13 per cent. only is imported. During the years 1905 and 1906 the output of petroleum in the Baku district, owing to strikes and other disturbances, was so materially reduced that the large stocks were exhausted, and a fuel famine began in the beginning of 1906. What is called the Central Region, in the Moscow district, with its extensive textile industry, was the first to suffer. The consumption of fuel in that district amounts to about 30 per cent. of the consumption of the whole Russian industry; naphtha being mainly used. As affairs in Baku did not mend, users began to look for fuel at less ruinous prices from elsewhere. At the instance of the Government the question was made the subject of a conference, and there is reason to believe that a cheaper and more regular transport of coal from the Donetz and Tula coalfields and also from the Baltic ports may be brought about. The output of coal from the Donetz district is steadily and rapidly increasing, that for 1906 being 1,613,000 tons more than during 1905. To remove the difficulties in the way of transport it is proposed to build a new double line of railway some 40 versts (27 miles) long, and to doubletrack the existing line, which is 514 versts (243 miles) long.

Russia has also, through her concession from the East Chinese Railway Company, entitling her to carry on mining undertakings within 100 versts (66 miles) of the Manchurian Railway, access to large coal deposits in Manchuria. The war with Japan cost Russia the rich coal mines at Iantai and Funchan; but the coal mines at Dschalainor, which are only 2 versts (1⅓ mile) distant from the railway, remained in Russian possession. These mines are being worked by the railway company, which has also commenced working the coal deposits at Udsiminsk. There are also rich coal deposits in Northern Manchuria, within the concession area, but the working of these has not yet been taken in hand.

Colliery Notes, Observations and Comments

Practical Hints Gathered from Experience and from the Study of Problems Peculiar to Bituminous and Anthracite Coal Mining

DEVELOPMENT AND MANAGEMENT

In shot-firing, the practice of shortening the fuse or not using a fuse that will reach to the outside of the hole, is pernicious. This practice is followed for no other reason than to save a few pennies in fuse, at the risk of the miners' lives.

In cleaning the coal on a breaker platform picks with a single curved point and a hammer-head should be used. Picks of this kind may be considered as combined pick and sledge and are found efficient in clipping slate from the lumps of coal.

In designing a boiler plant at a colliery, it is well to make the floor a few feet below the natural level of the ground so that the supply of fuel may be dumped directly in front of the fireboxes. The same result may be obtained by building the fuel track on a trestle close to the boiler house so that the coal may be dumped into the chutes and run directly to the firing floor in front of the boilers.

In supplying water from a river or well where the water level fluctuates from time to time, a vertical, short-stroke piston type of pump with the cylinders separated has been found to act successfully. This arrangement permits the water cylinder to be placed below and the steam cylinder at the surface connected with the necessary rods and guides. This overcomes the inconvenience of having to go down into the river or well, also the cost per gallon for pumping the water is reduced.

At one of the newer mines in Ohio, near Wheeling, W. Va., all of the coal produced is mined by machines. The average output for several Goodman machines, based on 12 shifts, shows a production of 120 tons per machine per shift, each loader getting from nine to ten tons of coal per shift. It is stated that six men, working a total of 65 days of eight hours in loading after one machine, made $266.54, an average of $4.10 per man per day. It is said that the repair costs in operating the machines amounted to less than 0.33c. per ton of coal produced.

The Indiana coal operators do not believe the miners will be permitted to drill a larger hole in preparing for powder shots than contemplated in the new law, which limits the bit of the drill to 2½ in. The miners say that by using what is known as the one-jaw bit instead of the two-jaw bit commonly use, the pivot can be placed at the side of the bit instead of in the center and a hole nearly 4 in. in size can be drilled. It is said the miners have an opinion from the Deputy Attorney General, that it would be only a technical violation of the law, which says nothing about the size of the hole.

State Mine Inspector Epperson used his prerogative conferred by the last Indiana legislature, and arrested George Dodge and Wm. McQuade, both superintendents of mines in Linton, Indiana, the first for his failure to report a mine accident to him and the second for his failure to comply with an order from the inspector to make certain repairs and improvements in the mine he was superintending. Heavy fines were imposed on both men. In these arrests Inspector Epperson, for the first time, acted as police officer or exercised powers recently granted him.

Experience shows that when the fan is located directly over the upcast it is subjected to more danger from fire than when located a few feet away from the shaft. Besides the fire protection that results, the latter location permits the use of the shaft for occasional hoisting when making repairs. No pipe-line nor wire should be strung into the mine through the up-cast, if it can be possibly avoided as the exhaust air contains carbon dioxide, moisture and sulphurous gases which corrode the metals quickly. All pipe lines should be placed in the down-cast shaft.

The experience of engineers has shown that an average condensing engine of standard type requires from 20 to 30 times the amount of the feed-water for condensing purposes or about 1 to 1½ gal. of condensing water per minute per indicated horse power. It is absolutely necessary that the air pumps should be placed lower than the condenser. A good air pump and condenser should give 25 in. of vacuum and make available about 10 lb. more mean effective pressure with terminal pressure. A good condenser will save one fourth of the fuel or increase the power of an engine one fourth with the same amount of fuel.

In mining bituminous coal the direction of the cleat frequently determines the direction in which the working faces should be advanced in order to win the maximum amount of coal with the least amount of labor and at the same time reduce the amount of small coal or slack to a minimum. But in the system of working-rooms or chambers adopted in anthracite mining, the inclination of the measures determines the course in which the chambers should be driven. Hence it is impossible to lay out the workings so that the working faces will be driven in a direction pre-determined from the direction of the cleat.

In packing the water end of a piston rod it should be remembered that too tight packing will cause the rod to wear. If the mine water contains much acid the tendency of the piston rod is to corrode at one end more quickly than at the other end. In such cases, the ends of the rod become unequal in diameter and the larger end cannot pass through the stuffing box into the water cylinder. In order to avoid this so that the end of the rod that enters the water cylinder should not pass in to the steam cylinder and *vice versa*. Sometimes the rod is made in two pieces, one half of steel and the other half of bronze, joined by a clamp. In this arrangement the end that wears out the more easily can be replaced by a new one as often as necessary without renewing the whole rod.

In re-opening old workings experience has shown that it is well to drive gangways parallel to the old gangways by taking a skip from the pillars as the old gangways are apt to be more or less caved and it would not pay to remove the caved material and retimber them. In order to recover the pillars between the breasts, narrow chambers should be driven or a skip taken on one side of the old breast. The chambers should be as narrow as practicable in order to avoid much timbering. When the face reaches the desired distance, then skipping the pillars should be extended to the full width of the pillars at the face, and when retreating the whole pillar may be recovered. However, a stump of 20 to 30 ft. of each pillar should be left at the foot of the breast to protect the gangway.

A chain hoist up the plane to the head of a breaker should be provided with an effective system of blocks to stop the car in case of a runaway. The most economical method is to make the blocks of oak, shod with ¼-in. iron on the sides of the rail. The blocks should be screwed to the plane at the lower ends so that the fastenings will act as a hinge. The blocks should be kept in position on the rail by a green oak rod a few inches in diameter, which as it is elastic, acts as a spring. The rod should be fastened to the block and to the plane by means of staples so that, as the car goes up the plane, the wheels will push the blocks aside and allow them to slip back into place after the car has passed. After being dumped the cars should return on the empty track which should always have a descending grade of from 0.75 to 1 per cent.

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Illustrated.

Wall Street and the President

One of the absurdities of the present mid-summer is the theory, gravely discussed by the press and by people in general, that the policy of the administration in pursuing lawless corporations is responsible for the decline in the stock market. The President is not hostile to commerce and industry or to the corporations that are honestly engaged in business; he is merely proceeding against lawless trusts, which through their disregard of the statutes enacted by Congress have been for years engaged in unfair dealings, and through their rapid absorption of the wealth of the country were throttling industry. If there is any political responsibility for the present situation it is with them, not with the administration. Successful piracy might give an ephemeral prosperity to the ports where the gains were spent, but no one would argue that for that reason the welfare of the people was being properly promoted. If the cleansing of our industrial stable is going to produce a panic, by all means let us have it, and the sooner the better, so that we may start over again on a sound basis.

But of course we are not going to have a panic—the industrial condition of the United States is too sound for that—and the policy of the administration in pursuing a few prominent malefactors ought to have no other than a good effect. In leading the lambs to their last slaughter the pied piper of Boston advanced precisely this as a reason why people should buy stocks. Because financial circles had been purged, ergo stocks were a safer investment than previously. The argument was sound, but it was advanced prematurely and the prophet failed to read correctly the signs of fundamental conditions which were then strongly in evidence. Even now there is so much deliberate mystification from those who are blind or those whose interests are not suited by a recognition of the facts, that the public view of the situation is confused.

The fact is that the cause which has operated to reduce values is of world-wide effect, Great Britain, France and Germany suffering from it just as America does. Briefly the cause is the enormous industrial development of the last few years which in spite of the greatly increased production of gold has led to capital requirements largely in excess of the supply. The undertakings of new work have been immense. These produced greatly increased demands for labor and material, elevating wages and prices 25 to 100 per cent. and constantly making it more difficult for the resources of capital to carry things on. This has been manifested by the increasing dearness of money; the rate on real estate mortgages has risen in many cases to 6 per cent., and recently the trust companies have been paying 3 per cent. on balances, whereas it is but a little while ago that they would pay only 2 per cent. It was inevitable that the time should come when a contraction in business would be compulsory. In the grand finance these changes do not occur suddenly, although the public awakening to the fact that a change in conditions has been in progress may be sudden. We will not attempt to say when the present change began, but certainly it was clearly in evidence as long ago as last March.

To blame President Roosevelt for the present situation is ignorant, thoughtless and unjust. The weakness in the stock market was preceded by a weakness in the markets for commodities, especially for the metals. Yet with few exceptions the newspaper commentators have failed to see that the administration, if responsible for one, must also be responsible for the other. One intelligent enemy of the administration perceived this and charged that the President's attacks on a few lawless trusts and railway companies had so frightened the ultimate consumers of commodities that they would no longer buy copper, lead, spelter, etc.; hence the decline in their values; and hence the decline in the stock market. Truly this was a *reductio ad absurdum.*

The Mill Situation at Cripple Creek

The destruction of the Golden Cycle mill, at Colorado City, Colo., has precipitated trouble between some of the mine-owners of Cripple Creek and the mill trust. The facts are about as follows: The Golden Cycle company, in order to obtain long contracts—say two to five years—cut from $1 to $3 per ton, according to the grade of the ore, below the rates previously exacted by the mill trust. Immediately upon the Golden Cycle mill starting full operations, one of the two

plants owned and operated by the mill trust had to suspend operations, so the Union mill, at Florence, was closed down, its ore supply being contracted for and treated by the new Golden Cycle mill, and for several months past the mill trust has been running at only half capacity.

The unfortunate destruction by fire of the greater part of the Golden Cycle mill put it out of the market, and the mines which had contracted their ores there awoke to the fact that the contracts contained a fire clause, relieving the mill from all obligations until it resumed operations, and lengthening the contract by the time of the mill's enforced idleness.

Now these mine-owners have either to pay the price exacted by the trust, or close down their mines. All of them are threatening to close down pending the rebuilding of the Golden Cycle mill, and we are informed that some have already done so.

The position of the mill trust is clearly outlined in a recent interview given by J. D. Hawkins, general manager of the United States Reduction and Refining Company. Mr. Hawkins stated that his company had no desire to increase rates, but it would not grant a contract rate to Golden Cycle patrons who contemplated doing business with his company only until the Golden Cycle mill resumed operations. The contract rate on 1.25 oz. ore is $6.50 per ton, while the open rate is $9, this being the schedule at the Golden Cycle mill when it was operating. Replying to the charge that his company is forcing some of the big producers of the camp to close down because of exorbitant rates demanded for ore treatment, Mr. Hawkins said:

"The Golden Cycle company went into the market and constructed a large plant on a new process based on laboratory results as far as Cripple Creek ores were concerned, and without any verification in actual commercial operation, either as to what its metallic extraction would be, or what would be the cost per ton for handling, and made treatment rates which were based, not on what it knew the costs and extractions would be, but on what it thought they would be.

"Several years ago another company started operations and it happened to be at the same point and based on precisely the same principles as the above, and the result was that it ended in the bankruptcy court, and after its affairs were finally cleaned up there was an indebtedness of about a half million dollars, which never has been paid, and a large proportion of the loss fell upon the Cripple Creek shippers. The reduction company was not willing to meet the rates that were quoted for the treatment of ores by the Golden Cycle company, and consistently held to the low schedule which it had been quoting all along, for the reason that it was not willing to receive ore on a basis that would result in no profit and possibly a loss to the reduction company. Now, after the disaster, we do not intend to increase the rates and will be glad to enter into contracts with shippers at the rates quoted, which are precisely the same that were quoted constantly during our period of competition with the Golden Cycle mill."

According to Mr. Hawkins, the Golden Cycle company has refused to release its patrons from contracts with the mill, taking advantage of the fire clause in the contracts. We quote Mr. Hawkins at considerable length in order to give fully his side of the dispute, which is of great importance to the ore producers of Cripple Creek. They claim, with a good deal of justification, that the rates charged by the mill trust are extortionate and are throttling the mining industry of Cripple Creek. Mr. Hawkins' recent remarks are certainly disingenuous. The Golden Cycle company, to be sure, had not been in operation long enough to determine a year's average of extraction and cost, and its technical management was open to some criticism, but it was by no means experimenting with an untried process. Ten years ago there was a contest for supremacy in the treatment of the Cripple Creek ore between the chlorination and cyanide mills in which the former won, but the victory was over a comparatively undeveloped cyanide process. The Golden Cycle mill was planned by Philip Argall, than whom no one has had so much experience in the treatment of Cripple Creek ore by the cyanide process, and in it he aimed to embody the metallurgical improvements suggested by his highly successful work at Florence.. It was unfortunate that the Golden Cycle company did not allow him a free hand, and did not have his services at the beginning of its campaign; but nevertheless its mill and process embodied sufficient of his ideas to deprive Mr. Hawkins' disparaging remarks of their point.

Railway Rates in Mexico

On the face of the statements which one of our correspondents makes elsewhere in this issue, the contemplated increases in the railway rates on ore in Mexico are extortionate and likely to be so unwise that it is difficult to understand why they should be countenanced by the Government, which practically controls the railways of the Republic. The policy of the Mexican Government heretofore has been to promote the mining industry in all reasonable ways, taxing it only (and chiefly by direct taxation) a fair contribution toward the support of the Federal and State administrations. This has been a wise policy, because by the development of the mines, agriculture, manufactures and other industries have been stimulated, which have inured to the great benefit of the Republic. Of course, if the miners are now to be mulcted by a large amount, it is clear that not only they, but also all the people who are more or less dependent upon them will suffer.

The new schedule is the more surprising, inasmuch as the Government is only a partial participant in the spoils. Part goes to private pockets. The only defense for the new policy that will hold water is that the railways are not realizing a proper return upon the investment in them; but if that be the case, why has not that conclusion been reached before this late day; and why are not the rates increased on all commodities and passenger traffic as well? However, the magnitude of the increases is such that there is evidently more behind the matter than the proper desire to earn a fair profit, and the graded schedule savors of the unholy plan of charging all that the traffic will bear. Naturally there is a great outcry among the ore producers of Mexico. The situation is one which ought to cause the socialistic agitators, who have been commending the nationalization of the railways of Mexico, to pause and reflect. Also, the Mexican Government ought quickly to reflect upon the danger of tampering with the welfare of the goose that lays its golden eggs.

THE AMERICAN production of copper in 1906, according to the Geological Survey, was 906,591,947 lb., against 917,620,000 reported by the JOURNAL. The Survey's figure is too low and doubtless will be corrected in its final statement.

Views, Suggestions and Experiences of Readers

Comments on Questions Arising in Technical Practice or Suggested by Articles in the Journal, and Inquiries for Information

CORRESPONDENCE AND DISCUSSION

Mexico's Proposed New Railroad Tariffs

We in Mexico are confronted with the remarkable condition of finding the principal railroads of the country making splendid earnings, according to their last reports, and having more freight than they have been able to handle for over a year; yet endeavoring to persuade the Federal Tariff Commission to approve an entirely new system of ratings and classifications on all ore shipments over the Mexican Central and Mexican National railroads. These roads, with the lines operated by them, go to make up the great Mexican railroad merger in which the government is to hold a controlling interest. This spring has seen the minimum carload weight raised from 10,000 to 15,000 kg., thus working a hardship on many who will henceforth have to pay local freight rates because of inability to make up the required minimum weight. This will, however, be felt by the mining interests in very few instances. It is the recent move of the railroads, in the introduction and presentation to the government of a new schedule of rates on ore shipments, that threatens to cripple the mining and smelting industry seriously throughout the entire Republic.

Shipping Point.		To Aguascalientes.				To Torreon.				To El Paso.			
		Distance *	Class.			Distance	Class.			Distance	Class.		
			1st.	2d.	3d.		1st.	2d.	3d.		1st.	2d.	3d.
Pachuca	old rate	576	$9.36	$7.44	$5.12	1127	$12.82	$10.05	$7.58	1962	$15.30	$12.03	$9.34
	new rate				5 97				7.96				9 69
Mexico	old rate	586	9.44	7.50	5.18	1134	12.86	10.09	7.59	1971	15.32	12.05	9.36
	new rate				6.02				7.98				9.71
Guadalajara	old rate	492	8.67	6.92	4.64	1043	12.44	9.76	7.49	1878	15.14	11.87	9.08
	new rate				5.58				7.75				9.53
Ameca	old rate	582	11.37	9.62	6.89	1133	15.14	12.46	9.74	1968	17.84	14.57	11.33
	new rate				8.28				10.45				12.33
Marfil¶	old rate	221	5.67	4.59	2.75	772	10.88	8.58	6.20	1607	14.52	11.32	8.27
	new rate				3.80				6.83				8.98
Zacatecas	old rate	121	3.53	3.30	2.05	430	8.05	6.42	4.21	1266	13.43	10.53	7.72
	new rate				2.84				5.21				8.30
Parral	old rate	879	13.68	11.38	8.54	328	8.71	7.46	5.12	682	12.23	10.27	7.19
	new rate				9.60				6.63				8.77
Chihuahua	old rate	1034	12.36	9.63	7.17	473	8.48	6.76	4.51	363	7.38	5.88	3.74
	new rate				7.70				5.47				4.81

*Distances are in kilometers (kilometer = ⅝ mile). Rates are in Mexican currency per metric ton.

¶ Marfil is the shipping point for Guanajuato.

Present Rates and Classes

Heretofore the railroads have generally accepted ores for shipment on a release valuation of $25, Mexican, per metric ton, and the shipper has assumed insurance and taken upon himself the risk against loss, in order to obtain the cheaper rate for transportation. It is now proposed by the railroads that all ores be shipped and billed at the actual valuation, according to smelter returns, before freights have been deducted, and upon said valuation make three classifications, as follows: The first class to include ores that have a value of over $50, Mexican, per metric ton; the second class those of a value between $50 and $25, Mexican, per metric ton; the third class those of a value under $25, Mexican, per metric ton. This will compel the shipper to throw a greater risk upon the railroad, so that the latter may charge a higher freight rate for the higher grade ores. They could not well claim that it cost more to haul the richer ore, but may justly claim that they must cover or protect themselves by reason of the greater risk assumed. This, certainly, was a bad enough move, yet would perhaps not cause so much opposition, in view of the fact that the richer ores could stand a higher rating. But the railroads, not satisfied with this means of adding to their receipts, have also proposed to raise the rates on even the third-class ores materially, even largely. Under this third class the former release valuation would permit shipments to be classified.

The Old and New Rates

These proposed changes, however, may best be shown by the accompanying condensed tabulation of the old rates and the proposed new rates from some of the principal shipping points to smelting plants at Aguascalientes, Torreon and El Paso:

It needs only a glance at the foregoing table to see the enormous increase in the freight rates from a minimum of about 10 per cent. (for where it is less than that, as from Pachuca to El Paso, third class, it is on such long hauls that they would never be indulged in) to over 100 per cent., as from Marfil to Aguascalientes, first class. The latter would catch a large percentage of Guanajuato ore, rich silicious and high-grade copper and iron sulphide concentrates going to Aguascalientes. It is estimated that this means an increase in freights all around of about 50 per cent., calculated on the last 12 months' shipments, or close to $4,000,000, Mexican currency, to come out of the pockets of the miners. It is a most serious blow that is intended, and one under which the mining industry cannot stand. It means, if carried out, the cutting off of much low-grade ore and the closing down of many properties.

Possible Action

It might be said that these rates have been worked out by the railroads and almost surreptitiously presented to the government for approval; the proposed increase has not been made public and is not as yet generally known. The newspapers (which in Mexico means the *Mexican Herald*) have been remarkably quiet on the subject. By quietly working in this manner the railroads have prevented any combined action among the mining fraternity until now it may be too late; for, though not as yet approved, the railroads are urging approval with all possible insistence. It is to be hoped that all important shippers who have any influence whatever in Mexico will take some strong and immediate individual action with the president of the Tariff Commission, Lic. Don Luis Mendez, First Calle de Damas, No. 1, Mexico City.

It has been intimated that this may be a clever move of the government to have these new rates established before it takes over the control, so as not to have the blame. The expected increased returns would pay the interest on the bonds which the government is to guarantee. But if these new rates cause a curtailment of shipments, it may mean a greater loss in the volume of business and receipts therefrom than could be compensated for by the increase in rates.

B.

Mexico, Aug. 20, 1907.

During 1906 there was exported from Salonica, Turkey 3600 tons of manganese, which went to Servola, Liverpool, Marseilles and Rotterdam. There was also exported 5600 tons of chrome. The Cassandra Mining Company exported from Stratoni 16,300 tons of manganese, and 35,000 tons of iron pyrites.

New Publications

THE MINERAL INDUSTRY, ITS STATISTICS, TECHNOLOGY AND TRADE DURING 1906. Volume XV, Supplementing Volumes I to XIV. Edited by Walter Renton Ingalls. Pp. 954; illustrated. 6¼x 9¼ in.; cloth, $5. New York, 1907: Hill Publishing Company.

Contents. Aluminum. Alundum. Ammonia and ammonium sulphate. Antimony. Arsenic. Asbestos. Asphaltum. Barytes. Bauxite. Bismuth. Borax. Bromine. Calcium carbide. Carborundum. Cement. Chromium and chrome ore. Coal and coke. Copper. Copperas. Corundum and emery. Cryolite. Feldspar. Fluorspar. Fuller's earth. Garnet. Glass. Gold and silver. Graphite. Gypsum. Iodine. Iron and steel. Lead. Limestone. Lithia. Magnesite and magnesium. Manganese. Mica. Mineral wool. Molybdenum. Monazite. Nickel and cobalt. Ocher and iron oxide pigments. Petroleum. Phosphate rock. Platinum. Potassium salts. Precious stones. Quicksilver. Salt. Silica. Silicon. Sodium and soda salts. Strontium sulphate. Sulphur and pyrite. Talc and soapstone. Tantalum. Tin. Tungsten. Uranium. Vanadium. Zinc. Literature on ore deposits in 1906. Improvements in sampling and assaying. The advance in ore dressing in the last decade. Progress in ore dressing and coal washing in 1906. Mineral statistics of foreign countries. Index.

This new volume of "The Mineral Industry" deserves high praise in many respects. Such a publication may receive credit for the interesting monographs, prepared by experts, with which it is enriched, while it is, at the same time, deficient in the correctness and comprehensiveness of its statistics. Or it may challenge admiration by an early publication, effected at the cost of statistical completeness or up-to-date accuracy. It is in all these particulars that I recognize with pleasure the merits of this volume.

To begin with the date of its publication (considered, as it should be, with regard to the date of the information it contains), I note that the editorial work was completed at the end of May, indicating an exceptional degree of alertness and industry on the part of Mr. Ingalls and his assistants. Concerning the inevitable statistical omissions involved in such prompt and rapid work, I may say that I find them surprisingly few and unimportant. The summary for the world appears to lack recent figures from China, Japan and Russia. But reliable statistics from these countries, if they could have been secured by waiting a month or two (which I take leave to doubt), would scarcely have outweighed the disadvantage of the delay. I can heartily say that, taken as a whole, the contemporary picture of the mining industry, not only of the United States, but also of all other countries, presented in this volume, is unequaled—nay, unapproached—by any other publication in the world.

With regard to the monographs, treating of separate industries, and prepared by recognized authorities, this volume does not fall behind its predecessors—even those of the time of their glory, when Rothwell put into "The Mineral Industry" not only his own genius and enthusiasm, but also more money than it ever repaid. I am glad to believe that, as a result of his endeavors and sacrifices, the general appreciation of this uniquely valuable series has grown so great as to warrant its continued publication upon a scale worthy of his aspirations. For I can well remember how, after his death, the abandonment of "The Mineral Industry" as an unprofitable enterprise, was seriously contemplated. That its publication has not only been continued, but brought up to the old standard of excellence, is matter for gratitude on the part of an innumerable host of readers, and for special praise, at this time, of Mr. Ingalls and his co-laborers.

To return to the monographs—the list of authors comprises many names clothed with authority, such as those of L. S. Austin, H. Foster Bain, William M. Courtis, James Douglas, Charles H. Fulton, H. O. Hofman, James F. Kemp, Charles R. Keyes, George F. Kunz, C. E. Locke, Charles E. Munroe, D. H. Newland, Joseph W. Richards, R. H. Richards, Bradley Stoughton and H. A. Wheeler. But some of the best articles are from men less widely known. The authors of these contributions are fairly divided among instructors, editors, and practising experts. I may do no more than call attention to a few passages which have impressed me on a hasty examination of the book.

C. G. Atwater furnishes an interesting summary of the situation as to by-product coke-ovens, supplementing the articles by F. Schniewind in Vols. X and XI, and recording not only the statistics of production, but also the changes of construction and practice. Mr. Atwater, who has had experience with both the Otto-Hoffmann and the Semet-Solvay types of by-product ovens, states impartially the features and the commercial progress of each. There seems to have been a comparative lull in construction. During the four years ending with 1906, there were only 177 Otto and 400 Semet-Solvay ovens added to the number in use or preparation. By-product ovens of other types show a net increase of 95; and the total of all kinds is now 4306, as against 3634 at the end of 1902. These figures I have reached with some labor, after making in the table of Vol. XI the corrections required by Mr. Atwater's present statement. His own statement of the total increase is 642, instead of 672, as I make it, the difference being, I suppose, explained by his qualifying remark, "counting those that will be completed by the date of the issue of this article." The discrepancy is not important, except as it emphasizes the ambiguity of statistics which include intention as well as achievement. But Mr. Atwater furnishes the remedy by giving in another table the annual production of coke from by-product ovens, from which it appears that, although the number of such ovens has apparently increased, during the last four years, not more than 18 per cent., the product has increased about 29 per cent. This means, not at all that the ovens have increased in individual efficiency, but only that the tabulated number of ovens, four years ago, included many not then in operation, which have come into operation since. Another measurement of progress, stated by Mr. Atwater, is, as he himself indicates, likely to be misleading, namely, the percentage furnished by by-product ovens of the total coke product of the United States.

Nevertheless, after all explanations and qualifications, there is certainly a pause in the progressive use of by-product ovens which needs to be accounted for, and the significance of which is only enhanced by the fact that, according to Mr. Atwater's tables, the additional Semet-Solvay ovens of the last four years are mainly those which have been installed by new corporations, controlled by the owners of the patents. Mr. Atwater testifies (with complete warrant, as I think), to the commercial success of these enterprises; and it seems to me that this furnishes part of the explanation of the comparative lack of new licensees for the by-product patents. Namely, the profitable management of such plants involves so many commercial and administrative, as well as technical, conditions that the owners of the patents prefer the inauguration of new enterprises, wholly managed by their own thoroughly trained experts, to the acquisition of new licensees, for whose management they will be, in some degree, impotently responsible. On the other hand, the prosperity of the last four years is itself a sufficient explanation of the indifference of capitalists to improvements promising new economies. Necessity is not only "the mother of invention," but also the patroness who forces the recognition of her offspring by society. In other words, "flush times" never are, and "hard times" always are, the times of greatest progress in the industrial arts.

The account of progress in the metallurgy of aluminum, furnished by Prof. Joseph W. Richards, is intelligent but unsatisfactory. Probably Professor Richards, who is recognized as the leading American authority on this subject, knows more than he is honorably at liberty to tell. But I do not see why he could not have said plainly whether the Hall process of "differential smelting" for the production of pure alumina from bauxite is, or is not, now used by the Aluminum Company of America. Professor Rich-

ards described that process at the Bethlehem meeting of the American Institute of Mining Engineers, in February, 1906, and his account of it was published in Vol. XIV of "The Mineral Industry." But, so far as I am aware, it has never been authoritatively declared that this most ingenious and novel process had actually superseded in practice the humid methods previously employed for the purification of bauxite; and in the volume now before me, Professor Richards, describing the enormous development of the American aluminum industry, simply says that in the greatly enlarged chemical plant at East St. Louis, "the process used is the same as heretofore." The only hint as to the nature of that process is the inference which may be drawn from his allusion to the evaporating plant as "the most complete and largest of its kind ever built." This certainly seems to indicate a humid process as the basis of the enterprise. If that is a fair conclusion, what has become of "differential smelting?"

The section on Copper, compiled and edited by Mr. Ingalls, comprises contributions concerning various regions from Dr. James Douglas (Arizona), Robert N. Bell (Idaho), W. Spencer Hutchinson (Michigan), B. E. St. Charles (Montana), Charles R. Keyes (New Mexico), L. H. Beason (Utah), F. S. Mance and H. L. Hancock (Australia), C. A. Bohn (Mexico), W. Spencer Hutchinson (Newfoundland), and M. Otagawa (Japan). Of these, the last is, perhaps, the most freshly interesting and valuable. Mr. Otagawa speaks frankly, knows whereof he speaks, and enjoys the advantage of handling a subject novel to most of us. The same section contains a résumé of progress in the metallurgy of copper, by Prof. L. S. Austin, of the Michigan College of Mines, which covers the recent advances of both theory and practice, including many accounts of new American plants, which have appeared during the year in technical periodicals.

Profs. R. H. Richards and Charles E. Locke have supplied to the chapter on Gold and Silver an intelligent synopsis of progress in gold milling, and Alfred James and J. P. Hutchins have performed a similar service for the treatment of gold ores, and for hydraulicking and dredging respectively. Mr. James gives to Australia the credit of leadership in "up-to-date methods, high extractions and low costs."

Prof. Bradley Stoughton reviews the subject of the iron-ore supply, giving good reasons for an optimistic view, and discusses the more notable novelties and changes in the metallurgy of iron and steel. The great advance of the basic open-hearth process he justly places among the most important developments of the year. Other cardinal improvements are the employment of electrical power transmission and the introduction of electric smelting. It appears that, at the end of 1906, 20 electric iron or steel furnaces were running in Europe, one in England and five in the United States and Canada. Perhaps the most significant event of the year, however, was the action of the United States Steel Corporation in ordering gas engines aggregating 102,000 h.p., to be operated with blast-furnace gas. The year before, the Lackawanna Steel Works, with 40,000 h.p., was the only American plant including such engines, whereas Germany had them to the extent of 385,000 h.p. This nation, which was far in the rear, now becomes a good second to Germany.

Prof. H. O. Hofman contributes one of his valuable compilations of progress in lead smelting. The burning question of smelter smoke is briefly touched upon. Next year there will be more to say about it; for both the lead and the copper smelters of the country are unmistakably "up against it."

Harold C. George, in the chapter on Petroleum, emphasizes the continued decline of the Appalachian field, and the still more rapid and sudden falling off in the production of the Texas and Louisiana districts. It is clear that the future of the industry must lie largely in other countries.

Prof. Charles E. Munroe's contribution on Petroleum Refining in the United States (abstracted from Census Bulletin No. 70, issued in 1905) is highly interesting.

Passing over many other attractive and instructive chapters, I must notice in closing, the valuable articles of Professors Kemp and R. H. Richards. Professor Kemp, after an interval of two years, brings up to date his record of the literature of ore deposits; and Professor Richards, with the aid of Prof. C. E. Locke, presents a wonderfully full and careful survey of progress in ore dressing and coal washing. F. F. Colcord, chief chemist of the American Smelting and Refining Company, gives the latest news in the field of sampling and assaying.

The tables of the mineral production of different nations ,and a minute and copious index, conclude the book. It is a pity that comprehensive statistics of China, Russia, and Japan, could not have been included, at least in the form of approximate estimates. There is, in fact, a good deal of information concerning these countries scattered through the volume, which might have been made the basis of general estimates. But it is hard to find fault with a piece of work so much better than anything else of its class.

R. W. RAYMOND.

ELECTRICITY IN MINING. By Sydney F. Walker. Pp. 385; illustrated. 5½x 8½ in.; cloth, $3.50 net. New York, 1907: D. Van Nostrand Company.

Contents: Definitions, units, etc. Electric mining signals and telephones. Electric lighting for mines. The generation of electricity. Distribution of power by electricity. The application of electricity to driving machines, etc., in mines. Faults in electrical apparatus. Index.

This book is, of course, written from the standpoint of English practice mainly; but it contains much matter that will be applicable to mines elsewhere. It is written for the purpose of bringing into condensed form all that has been done with electricity in mines up to date; no easy matter, when we consider the rapid progress which has been made in recent years in electrical science and its practical application.

In Chapter I, the author has given the usual résumé, made as full as possible, of the underlying principles of electricity, with the terms, etc., in general use. In Chapters II and III he has given short descriptions of signals, telephones, and electric-lighting apparatus in use about mines. In Chapter IV he has gone fully into the question of the generation of electricity economically; discussing every possible source of power that may be available, and every possible source of economy. In Chapter V are discussed the principles and practice of the distribution of electricity, as it is applicable to mining work, giving descriptions of methods of distribution, even some of those that have been applied in a few cases only. Chapter VI deals with the application of electricity to the different machinery about a mine. In writing this chapter, the author had before his mind the fact that there is a large number of engineers, who are engaged in the application of electricity to mining work, and who necessarily are not familiar with the working of mines, when they first come to them. It has been the author's endeavor, in writing this chapter, to provide information that will enable the electrician to form a safe idea of the power he must provide in each case, while on the other hand he has endeavored to show mining engineers and mine managers how that power is to be delivered, and how they are to know when they have the proper amount. In Chapter VII the author has given a few simple rules for the discovery of causes of failure, and has endeavored to give a few simple rules that can be applied by any engineer who has acquired a certain knowledge of electricity, with apparatus that can be employed in any mine in any part of the world.

OFFICIAL PROCEEDINGS OF THE WESTERN RAILWAY CLUB FOR THE CLUB YEAR 1906-1907. Pp. 397; illustrated. 6x9 in.; cloth. Chicago, 1907: Western Railway Club.

UNDERGROUND WATERS OF MISSOURI, THEIR GEOLOGY AND UTILIZATION. By Edward M. Shepard. U. S. Geological Survey, Water-Supply and Irrigation Paper No. 195. Pp. 222; illustrated. 6x9 in.; paper. Washington, 1907: Government Printing Office.

Patents Relating To Mining and Metallurgy

A Selected and Classified List of New Inventions Described during the Past Month in the Publications of the Patent Offices

UNITED STATES AND BRITISH PATENTS

A copy of the specifications of any of these patents issued by the United States Patent Office will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications, correspondents are requested to give the number, name of inventor and date of issue.

ALUMINUM

REDUCTION OF ALUMINUM COMPOUNDS—E. L. Renman, Upsala, Sweden. Reducing aluminum compounds such as clay, etc., by mixing with an ammonia salt and heating, thus producing a corresponding salt of alumina and liberating ammonia. (Brit. No. 15,590 of 1906; Aug. 3, 1907.)

SOLDER FOR ALUMINUM. Carleton Ellis, Boston, Mass., assignor to Natraniel L. Foster trustee, Brookline, Mass. (U. S. No. 863,058; Aug. 13, 1907.)

BORAX

WASTE PRODUCTS. A. Foy and The Liverpool Borax Co., Ltd., Liverpool, England. Utilizing waste products in borax manufacture consisting of magnesium carbonate, calcium carbonate and compounds of silica and soda, by mixing them with alginates and fibre to form boiler coverings. (Brit. No. 4193 of 1907; July 20, 1907.)

COAL AND COKE

COAL-CUTTING MACHINE. John Lippis, Coalcreek, Colo. (U. S. No. 862,831 and 862,832; Aug. 6, 1907.)

COAL-CUTTING MACHINES. Ernest Heckel Company, Saarbruck, Germany. In coal-cutting machines for the long-wall system, improved methods of mounting the motor so as to economize space. (Brit. No. 54 of 1907; July 27, 1907.)

COKE APPARATUS. W. Schumacher, Dusseldorf, Germany. Improved apparatus for quenching, screening, and conveying coke. (Brit. No. 14,964 of 1906; Aug. 3, 1907.)

COKE-DRAWER. George C. Landis, Connellsville, Penn. (U. S. No. 861,292; July 30, 1907.)

COKE-EXTRACTING MACHINE. Enoch H. Abraham, Uniontown, Pa., assignor to Covington Machine Co., a corporation of Virginia. (U. S. No. 863,484; Aug. 13, 1907.)

COKE OVENS. F. J. Collin, Dortmund, Germany. Improvements in horizontal regenerative coke ovens. (Brit. No. 7650 of 1907; July 20, 1907.)

COPPER

COPPER AND BRASS SCRAP REFINING. T. Callow, Newcastle on Tyne, England. A flux for use in refining copper and brass scrap consisting of equal parts of chalk and fluorspar with smaller amounts of glass borax and coal dust. (Brit. No. 15,612 of 1906; July 19, 1907.)

PLATING WIRE. J. B. Clemens, Paris, France. Improved method of producing sheetwire thinly coated with copper. (Brit. No. 135 of 1907; Aug. 10, 1907.)

PYRITIC SMELTING — Apparatus for Pyritic Smelting. Christopher Antoonovich, St. Petersburg, Russia. (U. S. No. 861,693; July 30, 1907.)

SMELTING METHOD — Method of Smelting and refining copper ores and compounds. Ralph Baggaley, Pittsburg, Penn. (U. S. No. 862,378; Aug. 6, 1907.)

FELDSPAR

TREATMENT OF FELDSPAR—Extraction of Potassium Compounds from Feldspar. Aurelius J. Swayze, Great Meadows, N. J. (U. S. No. 862,676; Aug. 6, 1907.)

GOLD AND SILVER

CYANIDE SOLUTIONS. W. A. Merralls, San Francisco, Cal. An improved tank for agitating cyanide solutions. (Brit. No. 1,344 of 1907; July 27, 1907.)

METAL RECOVERY FROM SOLUTIONS—Methods of recovering precious metals from solutions. Isaac Anderson, McCabe, Ariz., assignor of one-half to Samuel A. Whipple, McCabe, Ariz. (U. S. No. 861,628; July 30, 1907.)

SLIMES TREATMENT. Charles E. D. Usher, Jeppestown, Johannesburg, Transvaal. (U. S. No. 860,775; July 23, 1907.)

GRAPHITE

GRAPHITE POWDER. E. G. Acheson, Stamford, Ont. The use of tannin compounds for preventing graphite powder from becoming flocculent. (Brit. No. 7,775 of 1907; Aug. 3, 1907.)

IRON AND STEEL

AGGLOMERATING IRON ORES—Process of agglomerating pulverulent iron ores. Wilhelm Schumacher, Oberdollendorf, Germany, assignor to Ernest Thalmann, New York, N. Y. (U. S. No. 862,666; Aug. 6, 1907.)

BLAST FURNACE GASES. C. Flossel, Munich, Germany. Improved rotary apparatus for removing dust from blast furnace gases. (Brit. No. 14,496 of 1906; July 13, 1907.)

BLAST FURNACES—Automatic Slip-Return Pipe for Blast Furnaces. Austin J. Fulton, Sharon, Penn. (U. S. No. 860,970; July 23, 1907.)

CHARGING APPARATUS. Wellman-Seaver-Morgan Co., Cleveland, O. Improved apparatus for discharging and charging steel and other furnaces. (Brit. No. 18,430 of 1906; July 19, 1907.)

CHARGING DEVICES. B. W. Head, London, England. Improved gripping devices for charging and discharging ingots into or out of furnaces. (Brit. No. 19,540 of 1906; Aug. 10, 1907.)

COPPER PRODUCTION—Method of Recovering Sulphate Crystals. Horace E. Horton, Waukegan, and Frederick C. Gedge, Evanston, Ill., assignors to American Steel and Wire Co., Worcester, Mass., a Corporation of New Jersey. (U. S. No. 863,279; Aug. 13, 1907.)

DRY AIR BLAST. G. Cattaneo and J. Schlesinger, Berlin, Germany. Drying air for use in blast furnace, etc., by passing it through a shower of cold liquid such as chloride of magnesium. (Brit. No. 13,935 of 1906; July 13, 1907.)

ELECTRIC SMELTING. A. T. Simpson Balbao, Spain, and A. E. Bourcond, London, England. Improvements in the inventors' process for electric smelting of iron ores, especially with relation to the regeneration of the escaping gases. (Brit. No. 21,770 of 1906; July 27, 1907.)

FERROSILICON—Process of Producing Ferrosilicon. Edgar F. Price, Niagara Falls, N. Y. (U. S. No. 861,224; July 23, 1907.)

IRON SMELTING—Charge Mixture for Iron-Smelting. Horace W. Lash, Cleveland, Ohio. (U. S. No. 862,978; Aug. 13, 1907.)

MAGNETIC SEPARATOR. Metallurgiska Patent Aktiebolaget, Stockholm, Sweden. A magnetic separator for pulverized iron ores in which the ores float on water and the magnetic particles are lifted out by the magnets. (Brit. No. 210 of 1907; Aug. 3, 1907.)

MANGANESE STEEL—Method of Manufacturing Metals and Compositions Used Therein. Hans Goldschmidt and Otto Weil, Essen-on-the-Ruhr, Germany. Filed May 2, 1906. Serial No. 314,890. (U. S. No. 860,799; July 23, 1907.)

PERMEABILITY OF IRON. R. A. Hadfield, Sheffield, England. Method of increasing the permeability of the inventor's silicon irons to make them more suitable in electric work. (Brit. No. 2,377 of 1907; Aug. 3, 1907.)

SCALE REMOVAL. S. O. Cowper Coles, London, England. Removing scale from iron articles by placing them in an air tight chamber and introducing hydrogen gas. (Brit. No. 23,664 of 1906; July 27, 1907.)

SILICOSPIEGEL—Process of Producing Silicospiegel. Edgar F. Price, Niagara Falls N. Y. (U. S. No. 861,225; July 23, 1907.)

STEEL MANUFACTURE—Process for Preparing Steel of High Grade from Ordinary Iron. Adam Massot, Jr., Mutterstadt, Germany, assignor to Fritz Andre, Haardt, near Neustadt a/H, Germany. (U. S. No. 861,999; July 30, 1907.)

NICKEL AND COBALT

ALLOY—Nya Accumulator Aktiebolaget Jungner, Stockholm, Sweden. In electric accumulators, substituting for nickel used as anode, an alloy of nickel with iron, copper, or zinc. (Brit. No. 6,522 of 1907; July 13, 1907.)

POTASSIUM SALTS

CAUSTIC POTASH — Salzbergwerk Neustassfurt and Theilnehmer, Zscherndorf, Germany. A method of producing crystalline hydrate of potash as a commercial article. (Brit. No. 6,405 of 1907; July 27, 1907.)

SALT

CHLORINE MANUFACTURE. G. B. Rambaldini, Milan, Italy. In the electrolysis of substances such as common salt the arrangement of currents of the electrolyte and of the supply of salt to be decomposed in such a way as to make it possible to work without a diaphragm. (Brit. No. 8,039 of 1906; Aug. 3, 1907.)

SLATE

SLATE WASTE. T. Morgan and P. S. Armstrong, Liverpool, England. Utilization of slate waste by crushing fine and using it as a road-making substance. (Brit. No. 6,863 of 1907; July 20, 1907.)

VANADIUM

VANADIUM ORE TREATMENT—Process of Treating Vanadium Ores. Felipe de Lucio, Huaraucaca, Peru. (U. S. No. 863,076; Aug. 13, 1907.)

ZINC

CALAMINES—Process to Utilize the Inferior Calamines. Francisco S. Moyano, Aguilas, Spain. (U. S. No. 863,417; Aug. 13, 1907.)

SCREW MANUFACTURE. S. Frank, Frankfort on Main, Germany. Producing zinc rods suitable for turning into screws, etc., as a substitute for brass by forcing cast rods of cylindrical forms through holes of smaller cross section, by high pressure, and when cold. (Brit. No. 1,167 of 1907; July 13, 1907.)

SULPHIDE ORE TREATMENT — Treatment of Sulphide Ores Containing Zinc. Ralph W. E. MacIvor, London, England, assignor to Metals Extraction Corporation, Limited, London, England, an Incorporated Company. (U. S. No. 863,411; Aug. 13, 1907.)

MINING—GENERAL

MINE TIMBERS. G. Keller, Ersenach, Germany. Improved form of toggle jointed struts used in mining. (Brit. No. 27,264 of 1906; Aug. 10, 1907.)

ORE DRESSING

CONCENTRATING TABLE. H. L. and E. A. Sulman, London, England. A form of buddle or concentrating table on which the material to be treated is periodically rolled over by a squegee so that the action of the water running

down the surface may be more effective in floating off the lighter particles. (Brit. No. 9,981 of 1906; Aug. 3, 1907.)

CONCENTRATOR—Ore or Sand Concentrator. Frederick A. Wiswell, Salt Lake City, Utah, assignor to Wiswell Milling Machinery and Mining Co., Salt Lake City, Utah. (U. S. No. 861,787; July 30, 1907.)

CRUSHING AND GRINDING MILLS. M. F. Abbe, New York, N. Y. In crushing and grinding mills, improved arrangements for screening the ground material and returning the larger portions to the mill. (Brit. No. 11,127 of 1907; Aug. 3, 1907.)

JIG. A. Taylor, London, England. A jig for very fine minerals, and means for producing rapid vibration. (Brit. No. 16,256 of 1906; July 19, 1907.)

ORE-FEEDER. Grant B. Shipley, Milwaukee, Wis., assignor to Allis-Chalmers Co., Milwaukee, Wis., a Corporation of New Jersey. (U. S. No. 863,229; Aug. 13, 1907.)

ORE SEPARATION—Process of Separating Ore. Henry H. Wait, Chicago, Ill., assignor to International Separator Co., Chicago, Ill., a Corporation of New Jersey. (U. S. No. 861,782; July 30, 1907.)

QUARTZ-MILL. Charles E. Humphreys, Walker, Cal. (U. S. No. 860,747; July 23, 1907.)

METALLURGY—GENERAL

CASTING METALS. F. Wynne, London, England. Keeping up the temperature of molten metal during pouring, by means of electric currents. (Brit. No. 18,835 of 1906; July 27, 1907.)

ELECTRIC FURNACE CHARGING—Method of Charging Electric Furnaces for Producing Carbide from Lime and Carbon. Albert J. Petersson, Alby, Sweden. (U. S. No. 863,044; Aug. 13, 1907.)

ELECTRIC SMELTING. Paul L. T. Heroult, La Praz, France, assignor to Société Electro-Metallurgique Francaise, Froges, France. (U. S. No. 861,280; July 30, 1907.)

ELECTROLYSING—Method of Depositing and Recovering Metals. Wilbur A. Hendryx, Denver, Colo. (U. S. No. 860,661; July 23, 1907.)

ELECTROLYTIC ORE REDUCTION—Apparatus for Electrolytic Reduction of Metals from Ores or Salts. Charles E. Robertson, St. Louis, Mo. (U. S. No. 861,319; July 30, 1907.)

METALLIC SULPHIDES—Process of Reducing Metallic Sulphides. Edward L. Anderson, St. Louis, Mo., assignor of one-fourth to Thomas B. Harvey, St. Louis, Mo. (U. S. No. 862,871; Aug. 13, 1907.)

ORE TREATMENT—Art of Treating Ores Containing Tungsten, Uranium, Vanadium, Molybdenum, etc. Robert McKnight, Pittsburg, Pa. Filed Nov. 20, 1906. Serial No. 344,344. (U. S. No. 862,987; Aug. 13, 1907.)

RETORT LINING—Refractory Lining for Retorts. Frank B. Smith and Guilford C. Glynn, Iola, Kan. (U. S. No. 860,701; July 23, 1907.)

SLAG-HANDLING PLANT. Victor R. Browning, Nottingham, Ohio. (U. S. No. 861,803; July 30, 1907.)

SMELTING PROCESS—Automatic Continuous Ore-smelting Process for Reverberatory Furnaces. Geo. G. Vivian, Denver, Colo., assignor of one-half to Lafayette Hanchett, Salt Lake City, Utah. Filed Mar. 18, 1907. Serial No. 363,067. (U. S. No. 862,683; Aug. 6, 1907.)

SOLDERING. S. L. Smith and T. Harden, London, England. Method of joining plates of lead, zinc, tin, etc., by means of a flux of stearine, vaseline and methylated spirit, and passing the plates under considerable pressure and heat. (Brit. No. 17,915 of 1906; Aug. 3, 1907.)

MINING MACHINERY AND APPARATUS

BELT CONVEYERS—Discharging Apparatus for Belt Conveyers. Thomas A. Edison, Llewellyn Park, Orange, N. J. (U. S. No. 861,819; July 30, 1907.)

COMPRESSED AIR ROCK DRILLS. C. T. Carnahan Co., Colorado. Detailed improvements in compressed air rock drills. (Brit. No. 21,646 of 1906; July 13, 1907.)

CONVEYERS—Filler Apparatus for Conveyers. Karl Deesz, Cologne, Germany. (U. S. No. 861,505; July 30, 1907.)

CONVEYING APPARATUS—Tripper or Deliverer for Conveying Apparatus. Lincoln Moss, New York, N. Y., assignor to Robins Conveying Belt Co., New York, N. Y., a Corporation of New Jersey. (U. S. No. 863,202; Aug. 13, 1907.)

DEEP BORING APPARATUS. A. Raky, Ekelenz, Germany. Improvement in the mechanism for operating deep boring apparatus. (Brit. No. 8,072 of 1907; Aug. 3, 1907.)

HAULAGE. F. V. Martin, Ipswich. Improved clip for attaching mine wagons to haulage ropes. (Brit. No. 18,843 of 1906; Aug. 10, 1907.)

HAULAGE. T. Errington, Newcastle on Tyne, England. An improved clip for attaching mine wagons to haulage ropes. (Brit. No. 21,202 of 1906; July 19, 1907.)

HAULING APPARATUS. E. and W. Cramp, Leicester. Improved apparatus for gripping guide ropes in case the hauling rope breaks. (Brit. No. 21,101 of 1906; Aug. 10, 1907.)

HOISTING APPARATUS and Transporting Means Therefor. Frederick Sandwisch, Woodville, Ohio. (U. S. No. 863,098; Aug. 13, 1907.)

HOISTING CABLE. W. W. West, Pretoria, South Africa. In cable haulages for mining purposes providing an interchangeable liner to the jockey that grips the rope. (Brit. No. 14,494 of 1906; July 19, 1907.

LUBRICATING METHOD. T. L. Evans, Pontypool. Improved method of lubricating the axles of pit wagons. (Brit. No. 24,508 of 1906; Aug. 3, 1907.)

METAL MINE PROPS. F. Nellen and A. Voight, Essen, Germany. In the inventors' system of metallic telescopic props for mines, means of covering the metal with fibre impregnated with tar. (Brit. No. 12,098 of 1907; July 27, 1907.)

MINE-CAR AXLE. Charles A. Keller, Rosedale, Ind. (U. S. No. 862,643; Aug. 6, 1907.)

MINE-CAR MOTOR. John B. Merwin, Springfield, Ill. (U. S. No. 863,077; Aug. 13, 1907.)

MINE PROP. H. Lowe, Mansfield. A telescopic pit prop in which both parts are of timber, and iron is only used for holding them together. (Brit. No. 19,507 of 1906; July 13, 1907.)

MINER'S DRILL. Enos Clark, Midland, Ind., assignor of one-half to Leonard R. Luets, Midland, Ind. (U. S. No. 863,508; Aug. 13, 1907.)

MINER'S LAMP. Frank A. Smith, Victor, Colo. (U. S. No. 862,027; July 30, 1907.)

MUCKING-MACHINE. Elmer W. Durfee, Bingham Canyon, Utah. (U. S. No. 863,368; Aug. 13, 1907.)

PROSPECTING TOOL. Thomas Johnstone, Muskegon, Mich. (U. S. No. 861,859; July 30, 1907.)

ROCK DRILLING. E. G. A. R. Gibbs, and W. G. Moon, Johannesburg, Transvaal. An apparatus for directing a spray of water on the working face during rock drilling operations. (Brit. No. 16,098 of 1906; July 19, 1907.)

ROCK DRILLS. J. V. Rice, Bordentown, N. J. Detailed improvements in the structure of gas operated rock drills. (Brit. No. 1,709 of 1907; Aug. 10, 1907.)

ROCK DRILLS. J. V. Rice, Bordentown, N. J. In rock drills actuated by gas engines attached, means of rotating the drill and other improvements. (Brit. No. 423 of 1907; Aug. 3, 1907.)

SAFETY DEVICE for Mine-Shafts. James Wilson, Livingston, Ill. (U. S. No. 861,785; July 30, 1907.)

SAFETY LAMPS. E. A. Hariwood, Leeds. Apparatus, for testing the efficiency of miners' safety lamps. (Brit. No. 25,258 of 1906; July 19, 1907.)

SAFETY LAMPS. J. Prestwich, Manchester, England. Improvements in miners' safety lamps with the object of enabling them to be easily taken to pieces and reunited. (Brit. No. 3,057 of 1907; July 20, 1907.)

STONE CUTTING. I. M. McKay, Fruitvale, Cal. Improved blades of stone-sawing machines where steel shot is used as abraiding material. (Brit. No. 4,012 of 1907; July 27, 1907.)

METALLURGICAL MACHINERY AND APPARATUS

FURNACE CHARGE DISTRIBUTION. W. C. Mitchell, Chesterfield. A swinging hopper for use in distributing the charges in blast furnaces, gas producers, etc. (Brit. No. 19,818 of 1906; Aug. 3, 1907.)

METAL-POURING APPARATUS. Peter Thill and John H. Klepinger, Great Falls, Mont. (U. S. No. 863,469; Aug. 13, 1907.)

SLAG CAR—Motor-Tipped Slag-Car. John C. Buckbee, Chicago, Ill., assignor to Allis-Chalmers Co., Milwaukee, Wis., a Corporation of New Jersey. (U. S. No. 863,259; Aug. 13, 1907.)

TUBE OR PEBBLE MILL. Richard F. Abbe, New York, N. Y. (U. S. No. 863,483; Aug. 13, 1907.)

FURNACES

ELECTRIC FURNACE. A. Reynolds, London, England. An electric furnace in which the heat is generated in a resistance of loose carbon embedded in the crucible lining, the carbon being enclosed in solid carbonaceous material. (Brit. No. 26,981 of 1906; Aug. 10, 1907.)

ELECTRIC FURNACES. E. Gronwall, A. Lindblad and O. Stahlane, Ludvika, Sweden. Improved method of placing the primary coil in electric furnaces of the transformer type. (Brit. No. 6,193 of 1907; July 27, 1907.)

ELECTRIC FURNACE. I. Moscicki, Freiburg, Switzerland. A form of electric furnace in which is produced an extra long arc while using an alternating current at a comparatively low tension. (Brit. No. 14,259 of 1906; July 20, 1907.)

ELECTRIC FURNACES. Société Procedes P. Girod, Ugine, France. Improved methods of circulating the water used for cooling the crowns of electric furnaces. (Brit. No. 3,276 of 1907; July 27, 1907.)

ELECTRIC INDUCTION FURNACES. Johannes Härdén, London, England, assignor to Gröndal Kjellin Co., Limited, London, England. (U. S. No. 861,031; July 23, 1907.)

ELECTRIC FURNACES. S. Z. de Ferranti, London, England. Improvements in the inventor's electric furnaces. (Brit. No. 13,949 and 13,949A of 1906; July 19, 1907.)

ELECTRIC INDUCTION FURNACES. O. Frick, Stockholm, Sweden. An improved winding for electric smelting furnaces of the induction type. (Brit. No. 29,271 of 1906; July 27, 1907.)

ELECTRIC INDUCTION FURNACES. Société des Procedes Gin, Paris, France. In electric induction furnaces, improved methods of keeping up circulation. (Brit. No. 1,080 of 1907; July 27, 1907.)

ELECTRIC MUFFLE-FURNACE. Albert L. Marsh, Lake Bluff, Ill., assignor to Hoskins Co., Chicago, Ill., a Corporation of Illinois. (U. S. No. 861,744; July 30, 1907.)

FUEL CONNECTIONS. A. H. Cooper and E. D. Morgan, Middlesborough, England. In metallurgical furnaces improved means of connecting the gas and air ports. (Brit. No. 28,936 of 1906; Aug. 10, 1907.)

FURNACE LINING. H. A. D. Collins, London, England. Bricks for lining steel furnaces composed of silica 93 parts, sodium silicate 5 parts, and calcium chloride or lime 2 parts, molded together and burnt at a very high temperature. (Brit. No. 15,734 of 1906; July 13, 1907.)

MELTING FURNACES. A. Koch, Hanover, Germany. Improvements in furnaces used in melting metals whereby the heat of charges shall be utilized in melting the successive charge. (Brit. No. 14,710 of 1906; Aug. 3, 1907.)

REFRACTORY ORE TREATMENT—Furnace for the Treatment of Refractory Ores. Walter P. Wynne and James H. Grant, Ballarat, Victoria, Australia. (U. S. No. 862,229; Aug. 6, 1907.)

ROASTING FURNACE. George E. Kirk, Toledo, Ohio, assignor to Allis-Chalmers Co., Milwaukee, Wis., a Corporation of New Jersey. (U. S. No. 863,187; Aug. 13, 1907.)

ROASTING FURNACE—Water-Cooled Stirring Shaft for Roasting Furnaces. William J. Becker, Milwaukee, Wis.; (U. S. No. 863,139 and 863,140; Aug. 13, 1907.)

ROASTING FURNACE. William A. Rankin, Milwaukee, Wis., assignor to Allis-Chalmers Co., Milwaukee, Wis., a Corporation of New Jersey. (U. S. No. 863,045; Aug. 13, 1907.)

ROASTING FURNACES. Humbolt Engineering Company, Cologne, Germany. Improved joint for attaching stirrer arms in mechanical roasting furnaces. (Brit. No. 27,061 of 1906; July 27, 1907.)

SMELTING FURNACE. George G. Vivian, Denver, Colo., assignor of one-half to Lafayette Hanchett, Salt Lake City, Utah. (U. S. No. 862,684; Aug. 6, 1907.)

Personal

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Alfred Frank, one of the Heinze engineers, has gone to Alaska to examine copper prospects.

W. J. Judson, of Woodbury, Conn., is making an inspection of properties in the Manitou Lake gold area, Ont.

Herman C. Bellinger, formerly with the smelter at Crofton, B. C., spent a few days in Butte, Mont., recently.

A. H. Wethey, general manager of W. A. Clark's properties in Montana, will be a visitor in New York about Sept. 15.

Ernest A. Stone, of Toronto, has accepted the professorship of civil engineering in Dalhousie University, Halifax, N. S.

Jules de Catelin has been appointed administrator delegate of the Compagnie Francaise des Mines du Laurium, to succeed O. Maggiar.

R. H. Wolff, of New York, American representative of the Heroult process for the electric treatment of iron ores, sailed for a short trip to Europe.

H. T. Hulst has been appointed chief engineer of the Marquette range iron mines of the United States Steel Corporation, succeeding Andre Formis.

J. T. Shadforth, ironmaster of Newcastle-on-Tyne, England, is in Vancouver, B. C., in connection with the erection of a modern steel plant backed by British capital.

Walter S. Stephan has left the employ of the Wellman-Seaver-Morgan Company and has opened an office as consulting mechanical engineer in the Citizens' building, Cleveland, O.

F. D. Laughlin, formerly vice-president of the Atlantic Brass Company, has been appointed Eastern sales agent of the Pittsburg Pneumatic Tool Company, with headquarters in New York.

R. W. Perks, M. P., of London, Eng., is in Ottawa, conferring with the Canadian government in regard to a proposal on behalf of a company he has organized to build the Georgian Bay canal.

Charles G. Yale, of San Francisco, associate editor of the JOURNAL, will visit the Jamestown exhibition as a member of the jury of awards, and about Sept. 20 will spend a few days in New York.

C. V. R. Townsend, agent of the Cleveland-Cliffs Iron Company's land department, Negaunee, Mich., has been appointed a member of the commission to investigate forestry conditions in Michigan.

Dr. H. M. Ami, of the Canadian Geological Survey, and Dr. Adams, of McGill University, Montreal, have sailed for Europe as Canadian delegates to the centenary meeting of the Geological Society of London.

H. S. Denny, consulting engineer, of London, who has been examining property at Butte, Mont., returned to New York last week and from here proceeded to Deadwood, S. D., whence he will return shortly.

Parker Woodman, assistant superintendent of the Copper Queen mines, Bisbee, Arizona, has been appointed superintendent of the same property to succeed S. V. Clawson who has resigned after many years of service.

Charles H. Benjamin, who occupied the chair of mechanical engineering at Case School of Applied Science, Cleveland, for a number of years, has been elected dean of the schools of engineering of Purdue University, Lafayette, Indiana.

Charles T. Hutchinson, for several years manager of the department of mining machinery of the Union Iron Works, San Francisco, has resigned to accept a similar position with the Joshua Hendy Iron Works, also of San Francisco.

W. R. Ingalls, editor of the JOURNAL, returned this week from a Western trip of seven weeks, in the course of which he visited La Salle, Ill., Denver, Salt Lake City, Ely, Eureka and other districts in Nevada, San Francisco, the Coeur d'Alene and Butte, Mont.

W. A. Green, formerly with the Illinois Steel Wire Company, has been appointed treasurer of the Tennessee-Republic steel companies to succeed L. Hoover, resigned. T. M. Nesbit, of Birmingham, Ala., auditor for the Republic company, will act as auditor for both companies.

Obituary

F. T. Delashmutt, recently appointed receiver for the A. H. Whitsett Coal Company, was instantly killed by an explosion in the company's mine near Shelburn, Ind. The explosion seriously injured the mine boss and completely wrecked the tipple over the shaft.

A tablet in memory of Prof. T. Posepny, the eminent Bohemian geologist, will be unveiled at his native town, Starkebach, Bohemia, on September 8, 1907. After a procession in the morning, Dr. Philip Poeta, professor of geology and paleontology in the University of Prague, will deliver an address after which the tablet will be unveiled.

William Henry Rickard, for more than 30 years manager of the mines and smelter at Pontgibaud, in the Pûy de Dome, France, died at Redruth, Cornwall, on July 17, aged 71 years. He was a younger brother of Thomas Rickard, now living in London. When operations at Pontgibaud ceased about 10 years ago he retired, for the past few years living in Cornwall, the home of his forefathers.

Societies and Technical Schools

Morrison Mineral Collection—This collection, which was exhibited at the World's Fair at Chicago and for which its owner, E. G. Morrison, was awarded a gold medal, has been placed in the hands of Geo. H. Parker, No. 207 South Broadway, Los Angeles, for sale. It is said to be the most valuable private collection of minerals in California; it contains about 10,000 specimens, all collected, labeled and cataloged by Mr. Morrison, who was recently killed in a street car accident at the age of 80 years.

Industrial

The Cutler-Hammer Manufacturing Company, Milwaukee, has issued a pamphlet describing electric-crane controllers. In addition to full descriptions and illustrations of five types of crane and hoist controllers the publication contains connection and dimension diagrams, repair-part charts, etc. An improved form of contactor for handling heavy currents is also described.

The Westinghouse Electric and Manufacturing Company has been granted a preliminary injunction restraining the Wagner Electric Manufacturing Company of St. Louis, Mo., from making, selling or using self-regulating transformers which infringe the Stanley patent granted March 1, 1892. The injunction was issued by the United States Circuit Court for the southern district of New York.

Ira E. Stevens, agent for the Stevens fan and other mine equipment, Chicago, Ill., recently received an order from the Northwestern Improvement Company, Tacoma, Wash., for a 7½-ft. Stevens fan, to be driven by a Terry steam turbine. The fan will furnish 150,000 cu.ft. of air per min. with a 3-in. water gage. This is, so far as known, the first attempt to operate a mine fan with a steam turbine.

The firm Samuel Weil & Co. succeeds the firm Cerf. Hirsch & Co., New Orleans, La., which was dissolved April 27. Samuel Weil has resumed his residence in New Orleans and the new firm will continue to occupy the present offices, No. 232 Canal street. J. M. Cohn, who has assisted for many years in the management of the Bluefields, Honduras, establishment, has an interest in the new firm.

Trade Catalogs

Receipt is acknowledged of the following trade catalogs and circulars

The Denver Fire Clay Company, Denver, Colo. Assayers' and Chemists' Supplies. Pp. 350, illustrated, indexed, paper, 7x9½ in.; 1907.

Fred M. Prescott Steam Pump Company, Milwaukee, Wis. Catalog No. 20. Prescott Pumping Machinery. Pp. 146, illustrated, paper, 6x9 in.; 1907.

Special Correspondence from Mining Centers

News of the Industry Reported by Special Representatives at Denver, Salt Lake City, San Francisco and London

REVIEWS OF IMPORTANT EVENTS

San Francisco

August 21—The number of gold dredgers is rapidly increasing in California. Three of the largest size have been ordered for the Yuba Consolidated Gold Fields Company for use in the Yuba River field, near Marysville, and two more for the Marysville Dredging Company in the same region. At Oroville, in the Feather River field, a new one was put in commission last week by the Oro Water, Light and Power Company, and the same company will shortly have still another. The Pacific Gold Dredging Company, already owning three dredgers, will add one more, as will the Oro company. The Feather River Exploration Company, Ltd., has ordered lumber for another dredge. On the Fahey ranch, five miles from Oroville, the Gardella Bros. have a dredge nearly completed, and will soon begin on another on the Kentucky ranch, near Wyandotte. Up at Callahan, Siskiyou county, a new dredge is being built; and there are prospects of several being put in Greenhorn creek in Nevada county.

The city trustees of Oroville have decided to enforce the terms of the contract made by James C. Gray, owner of lands being operated by the Nevada Dredging Company, with the city in regard to leveling the dredged ground. Early in 1906 the trustees adopted an ordinance declaring dredging in the city limits a nuisance. The dredger people thereupon obtained an injunction in the United States District Court. The city filed an answer, but before a hearing was had a compromise was reached. Among the terms was one that dredger ground should be leveled within a certain time.

The Hearst Memorial Mining Building at the State University, Berkeley, California, will be formally dedicated this week. The building is a magnificent one, and is fully equipped for the use of students in mining and metallurgy.

The Standard Oil Company's Midway-McKittrick pipe line will be ready to handle oil by Sept. 1, though no oil will be sent in to the Kern river station until the pumping plant is completed, some months hence. No offers of contracts have yet been made to any of the McKittrick producers, however, and as most of the product is already contracted for, it is probable that the oil will not be handled as early as anticipated. Articles of incorporation of the Associated Pipe Line Company of California have been filed in the county clerk's office by the five directors of the company, E. E. Calvin, Willaim F. Herrin, George L. King, W. S. Porter and Frank H. Buck. The company proposes to operate a pipe-line system for the transmission of oil throughout the State, and will have its principal place of business in this city.

Miners continue scarce in Nevada county, the leading gold-producing county of the State, yet the wages paid are reasonably good and the climate excellent. The mines above Nevada City have a nine-hour schedule, but they pay machine men $3.50 a day, car men, $3 and blacksmiths $4. A number of operators up that way are trying to add to their crews and are having a hard time getting the help they need. In Nevada City and Grass Valley districts the eight-hour system prevails. The prevailing prices paid machine men range from $3 to $3.50 a day, car men from $2.50 to $2.75, and blacksmiths from $3.50 to $4.

The Heroult electrical iron smelter in Shasta county will now be run without interruption. Four casts of pig iron of six tons each have been turned out so far, and Shasta county is now on record as a regular producer of pig iron. Ten men to a shift are required at the smelter, in addition, of course, to a force of miners. Since the Northern California Power Company recently started its system, it has an abundance of power to meet present demands, and the Heroult plant can be run without shut downs. The Noble Electric Steel Company has been incorporated, with H. H. Noble, of the Northern California Power Company, at its head. It is now the intention to double the capacity of the smelter, and put in a railroad and an electric tram. A plant to manufacture electrodes will also be installed.

In the mountains of the San Bernardino range, especially on the desert side, much prospecting is now being done, and numerous mines are being developed. Prospectors are working all along the country from Victorville to Needles. The smelter at the latter point, which for years had rather a precarious existence, has lately been enlarged twice, and is running three shifts of men. New machinery is being put in. A number of small mining towns have recently been established in the more prosperous sections of the desert region of San Bernardino county.

The section lying east of Alleghany and Forest, in Sierra county, is attracting considerable attention, though very little development work has been done. Around Alleghany numbers of prospectors and miners have lately come in and considerable work is in progress. Some of the mines are paying well and anyone with claims making any kind of a showing, can readily dispose of them.

In the Blue Ledge district of Siskiyou county, on the borders of Oregon, a number of strikes have recently been made, in the St. Albans, Blue Extension and Bloomfield groups. On the St. Albans a 50-ft. ledge carrying $20 a ton in gold and from 4 to 8 per cent. copper, has been tapped by the main tunnel. More than 500 ft. of development work has been done on this property, which is an east extension of the Blue Ledge. This group is owned by Portland and Spokane mining men. The Seattle Mining Company is planning to erect a smelter on Seattle bar, four miles below Joe bar, and near the confluence of Elliot creek with the Applegate river. This smelter will not only treat the ore of the company's mines, but will do general custom work. The Forestry Department, through its local officials, has granted the Blue Ledge Company permission to operate a tramway across a portion of the Reserve, the tram to connect the adit tunnels with the ore bins. From this it is evident that the company is contemplating the erection of a smelter, the plant to be located at some point between the mine and Joe Bar.

At Angels, Calaveras county, the miners' strike continues and the mines remain closed. Superintendent Chalmers, of the Lightner, has been instructed by his directors to erect a fence around the property and keep the works closed until the men returned on the same conditions as were in force at the time the strike was called. At the present time there is no prospect of a settlement in either the Utica or Lightner mines. If the Utica company sells its water rights, flumes, ditches, pipe line and power plants to the Stanislaus Electric Power Company, as appears probable, it will be a long time before that mine will again be worked. The owners have stated that if the strike is not settled within a month, they will let the mine fill up, as it will not pay to keep handling the water during the winter season. A large number of the Calaveras merchants have suffered such great loss on account of the strike that it has been necessary for them to sell out their interests and leave the section. It is reported that fully 50 per cent. of the business houses have either sold out their stocks or closed down.

Duluth

August 24—State mineral options and private options for a large amount of land in the northern Otter Tail country have been taken out this week by B. Magiffin, representing Duluth mining men. This is about 100 miles southwest of the western extremity of the Mesabi range, as at present determined, but along the general strike of the range, if projected. Nothing is known of the evidences and information that led Mr. Magiffin to take these leases, which are but the last of many that he has taken up in various parts of northern Minnesota during the past two or three years, though it is known that the region carries more or less of what has been generally supposed to be the float of the regions to the north and east, carried down and deposited as terminal moraines.

There is a great deal of drilling and development on the Mesabi extension west of the Mississippi river, in townships 55-25, 55-26 and others, and there are reports of considerable depths of ore being cut by drills. But the ore is said to be uniformly of low grade, and to be covered by a great thickness of drift. Exploration in that section is conducted by guesswork, and is not a job for parties of small means.

The Mesabi strike is by no means over, and groups of idle men are to be seen in every mining town and on every corner, waiting till their wages are raised and their hours shortened before going back. They have been misled by the strike agitators, who are desirous of continuing the difficulty as long as possible, but who have already appealed for funds with which to carry it on, alleging the use of what they had in channels where it is known that very little has been used. General officers of the Western Federation are in charge of the strike and are holding their men well in hand, violence being at a discount and drunkenness almost unknown on the mining locations of the Mesabi at present. It is doubtless due very largely to the refusal of brewing companies to ship in beer and of the saloonkeepers of the district to sell indiscriminately, that there has been no outbreak of riot. The Oliver Iron Mining Company has brought in several hundred Austrians from other districts, who have been put at work in surface mines of the Hibbing district. No disturbances followed this importation, in part on account of the presence of many armed deputies and guards, who make the range resemble, to some extent, an armed camp. Some of the deputies have been too free with their guns and several men, some of whom have been working miners, have been injured. Very little can be done for a time in operating the important underground properties, and all efforts are directed toward sending out ore, which must come from the open-pit steam shovel mines. The steam shovel is a great strike breaker. Most of the underground mines of the range are shipping no ore except from stock and few are working at all. There is little stripping at surface mines, for there are not men enough to act as miners and strippers as well. The result will be an extensive development, both surface and underground during the coming winter, when miners will not be needed for shipments and can be turned to other work.

Shipments this week from all Minnesota roads have averaged about 130,000 tons per day, which is a considerable decline from maximum but doubtless sufficient to give the furnaces all the ore they will require during the coming winter. There has been a sharp lessening of demand for ore on the part of the non-bessemer producers; the bessemer producers are still pushed for all they can forward, and the requirements of the year will fall materially beneath the early season expectations.

Representatives of the Western Federation of Miners have met with a curious reception at various points in northern Michigan and Minnesota the past week. They have gone to the different ranges, ostensibly to collect funds to assist the miners of the Mesabi in their struggle against the Steel Corporation, in reality, probably, to organize those ranges as well as the Mesabi. In every town they have advertised meetings or attempted proselyting, they have found business men rising solidly to prevent their remaining and to stop their meetings. These men have gone so far as to compel the organizers to leave town at once and they have made representations as to what would occur if the organizers returned. The organizers have found no place, on the Marquette, Menominee or Gogebic ranges to lay their heads, much less collect funds. Mass meetings have been held, resolutions passed, and the visitors evicted in compliance with the orders of what may be called vigilance committees. Perhaps the most significant feature of the situation has been the fact that the miners themselves have taken part in the meetings and subsequent events.

Indianapolis

Aug. 24—Indiana coal operators say there has been a better demand for coal at the mines during the summer than for several years past. This is not due, however, they say, to the desire of consumers to profit by past experience and lay in their coal supply before fall, but because of the increased consumption of coal for industrial uses throughout this State.

A number of mine-owners recently made a tour of the State and report that the industrial growth and development in Indiana is surprising. New industries are being started and old ones enlarged on every hand, and there has been scarcely any suspension during the present summer. They also think that the increase in population is not properly realized when taking into account the increasing demand for coal.

The Indiana operators confidently expect some relief from the car shortage next winter under the new law, but think there will be a shortage. It is evident that the electric railroads of Indiana propose to take a hand in transporting coal from the mines. Those already in operation are building branch lines into the coalfields, while a new road is being surveyed through a territory in Warrick county interlaid with thick veins of coal of excellent quality. That the road will be constructed immediately is indicated by the rapidity with which mining companies and capitalists are taking options on every available acre of coal land adjacent to the proposed road.

The Monon people have constructed a new road 50 miles in length from Wallace junction west into the heart of the coalfields. This line will be opened for business Oct. 1.

Back of the recent corporation of the Covington & Southeastern Railroad is said to be a project to open up a new coalfield and make it tributary to the Chicago market. A large area of coal-bearing land has been purchased by the syndicates and surveys for the new road have been made from Covington to Crawfordsville.

Scranton, Penn.

Aug. 25—Notwithstanding the existence of the conciliation board and the excellent work it has rendered, 900 employees of the Pennsylvania Coal Company have gone out on strike at the Short Mountain colliery. The miners have been complaining for some time regarding the dockage system, it being alleged that some cars have been dumped and put through the breaker without giving the miner credit. One miner, it is alleged, was docked as many as 18 cars in two weeks and when he opened his due bill he found, that notwithstanding his work, he was in the debt of the company. A conference was held between the officials and some of the leaders of the men and it is expected that the men will return to work on the understanding that the grievances are to be settled within two weeks and in the event of failure to do so to refer the questions in dispute to the conciliation board.

A school of mining has been established by the Philadelphia & Reading Coal Company for the benefit of its employees, who number 30,000 and are scattered throughout 50 collieries. Six towns have been selected as the centers and the school moves from town to town until the circuit has been completed. The employees will be given free transportation in a special train to attend the school and addresses upon mining subjects will be given by the best talent available.

A novel arrangement was carried out

last week by the employees of the Lackawanna railroad at the Avondale mine who desired to suspend work so as to attend the annual picnic of the "Keg Fund." The general superintendent, Col. R. A. Phillips, suggested that owing to the rush of orders the men should go to work an hour earlier and leave the mine at 11 a. m., in time to attend the picnic. The company would build the stands for the picnic and furnish the lumber. The men gladly accepted the offer and no time was lost at the mine. The Dodson colliery of the Plymouth Coal Company at Plymouth has been closed for several weeks to permit of extensive repairs to the breaker.

Toronto

August 16—Prof. Willet G. Miller, provincial geologist of Ontario, left this week on a tour of inspection to the gold region of the Abitibi district, where some important finds have recently been made. He was accompanied by Noah Timmins, of Cobalt.

Valuable mineral discoveries are reported to have been made in Otto township, which lies about 12 or 14 miles west of Larder lake. Numerous samples of ore showing gold and silver have been secured from six claims held by Middleton Crawford, of Parry Sound, Ont., where several shafts have been sunk. One of these is on a vein 3 ft. wide at the depth of 25 ft., the rock containing galena, silver and lead, and on the side is a black schist formation showing free gold. A section of jasper quartz found at 12 ft. also carries gold. A large ledge of quartz shows gold on the surface and good samples were obtained. A company to develop these deposits will be formed.

The line of railway to run from Sudbury to Cobalt has been definitely located. It runs through mineral country nearly the entire distance, much of it being already staked. It connects with the Timiskaming & Northern Ontario road, near Cobalt, and running westward skirts the north shore of Portage bay. Crossing the Montreal river it runs southwest to Eagle lake, thence to Sharp Rock portage and southwest to Obabika lake, along the west shore of which it runs for some distance till it crosses over to the Sturgeon valley. It will give facilities to some valuable gold properties, and in the region nearer to Sudbury will tap a rich iron ore district, where many locations have been staked. The road will be about 90 miles long, and no heavy grading will be needed except near Sharp Rock portage.

The striking miners at Cobalt, on August 9, met at the station a party of 37 Nova Scotia miners, brought in by the mine-owners under contract, and induced them to refuse to work. The contract specified that they understood that there was labor trouble, but the men state that they were assured by the agent who engaged them that the strike was practically over. Others coming in later have also joined the ranks of the strikers. Yesterday the Buffalo Mines, Ltd., secured from Judge Falconbridge an injunction prohibiting the Cobalt branch of the Western Federation of Miners from interfering with employees or inducing them to go on strike or break their contracts.

A party of prominent business men from New York State, including William Muir, B. E. Strong, Andrew R. Koehler, William W. Watson, James C. Patterson and U. L. Upson, guests of J. H. Jewell, of the Erie Cobalt Mining Company, passed through Toronto on August 14 *en route* for Cobalt and Larder lake.

Chas. H. Gage, chief consulting engineer of the Salt Lake Smelting and Refining Company, has returned from an inspection of the ground at North Cobalt, where, it is stated, the company proposes to erect a large smelter at a cost of $2,000,000, with an initial capacity of 250 tons per day. Operations, it is said, will be begun by Sept. 1 and the work pushed forward as rapidly as possible.

London

August 8—The first annual report of South Crofty, Ltd., has just been issued. In some recent articles on Cornwall, I have referred to South Crofty as an example of the reorganization of an old Cornish mine on modern principles. During the year ended June 30, most of the crushing has been done by the old Cornish stamps, but 40 head of California stamps have now been started and another 20 head are in course of erection. The amount of ore crushed during the year was 11,412 tons, and the recovery was 117¾ tons of tin concentrates which sold for £13,153; 37 tons of wolframite which brought £5596; and 160 tons of arsenic (arsenious acid) which sold for £4244. The total income was £22,993. An additional magnetic separator is being installed and three new furnaces for recovering arsenic are being erected.

The decrease in shipments from Le Roi No. 2 has caused shareholders some anxiety, so that the directors have considered it advisable to issue a general statement of the position of things. They admit the restricted shipments and explain that it is due partly to the shutting down of the customs smelters, and partly to the severity of the past winter and the scarcity of labor. The mine itself is, however, in a fair condition and considerable bodies of ore have been opened up. The company is also actively testing the Vancouver group of silver-lead mines at Slocan, which promises to develop into a valuable property.

Johannesburg

July 29—Much excitement has been occasioned not only throughout South Africa, but in England as well, over a bill that the Botha ministry proposed in the House at Pretoria last week. This bill is referred to by the public as the "Beer Bill," and it was introduced for the purpose of making it legal to sell beer, ale, etc., to Kafirs working on the mines. Protests have been sent to Pretoria from the churches, temperance societies, commercial societies, the Mine Managers Association, and other bodies. The government has wisely decided to withdraw the unfortunate bill.

There is a persistent rumor just now that the opposition has induced the ministry to reconsider the whole question of Chinese labor at a short session of parliament to be held in November. If the rumor proves correct then the whole community will take hope, for if the question is reconsidered the Chinese will not go. At almost all the mines the Chinese are getting up petitions, asking for the privilege of signing on again for three years. In their original contracts the coolies are given the option of renewing for three years.

All the strikers have sent delegations to the managers asking to be taken on again. There are few positions open on the mines, and the majority of the strikers will either leave the country or join the ranks of the unemployed.

In the future it is probable that a larger number of white men will be employed on the mines to do rough labor. These men will be able to earn from £7 10s. to £10 per month. As the board paid on the mines at the present time varies from £6 to £6 10s., a man with so low a wage would not have much left for his board.

Some months ago the government appointed a commission to inquire into the law regarding the working of a mine with less than two shafts or outlets. It is unlawful for a mine to do any work, save development, when there is only one shaft. Several mines on the Rand find this law hard as they have only one shaft, and not sufficient money to put down another. The commission makes some important recommendations to the government. In the first place the report admits the danger of working a mine when there is only one shaft, but they advise the appointment of a permanent commission of five members to decide in each particular case whether stoping operations be allowed. Provided every precaution is taken as regards ventilation, fire, etc., the commission recommends that stoping be allowed in a mine having one shaft only, if the mine ceases all development work, save what is necessary to make the connection with a neighboring mine shaft, as soon as the winning of ore commences. The report has given satisfaction. It will soon now be possible for a mine, with a large tonnage developed and only one shaft, to win some of its ore, and raise sufficient cash to push through to another shaft in a neighboring mine. The government will no doubt accept the recommendations.

Mining News from All Parts of the World

New Enterprises, Installations of New Machinery, Development of Mines and Transfers of Property Reported by Special Correspondents

THE CURRENT HISTORY OF MINING

Alaska

Sheep Creek Option—The first payment on this option held by Colonel Sutherland of the Perseverance Company has been met. The company plans to drive a tunnel through the mountain to make an outlet on Gastineau channel, and to erect a 1500-stamp mill at this point.

California

AMADOR COUNTY

Defender—In this mine, at Defender, a small body of fine ore has been found on the 200-ft. level, running north. The mill will shortly be started up on this rock.

Illinois—This old claim, six miles from Sutter creek, is being reopened by J. W. Buchanan and others. The mine has not been worked for over 50 years.

BUTTE COUNTY

Mammoth Channel Gold Mining Company—At this gravel property at Magalia, E. R. Argesinger, manager, extensive contracts have been let for sinking a shaft, driving a tunnel, etc.

CALAVERAS COUNTY

Calaveras Mining and Development Company—This company, G. W. Kirkley, manager, is preparing to operate the old Kenross mine, near Whiskey Slide. A 4½-mile ditch will bring in water from Quintal gulch. There are both quartz and gravel mines on the property.

Peirano—These gravel claims, near Angels, John C. Benson superintendent, have a 500-ft. shaft and 2500 ft. of drifts, etc. The claims are wet ones, but large pumps will now be installed, operations having been resumed.

EL DORADO COUNTY

Alpine—This property, owned by George Wingfield, is to be equipped with compressors and machine drills.

Isabel—In this old gold mine, Garden valley, owned by G. M. P. Bennett, of Placerville, an important discovery of copper ore carrying gold has been made in the old shaft.

Taylor—At this mine Thompson Bros. are keeping the pumps running night and day, and will soon have the water down to the first level.

INYO COUNTY

Black Canyon Gold Mining Company—This company at Laws has purchased a complete power plant, consisting of engines, air compressor, drills, etc.

Gold Discovery—There is considerable local excitement over the discovery of high-grade ore six miles north of Oasis and three miles south of the Lookout mine.

Indian Queen—Work under direction of G. H. Hewitt has brought the workings into good copper ore. Lower down it is expected to find large bodies of lower grade ore.

Silver—On ground owned by Keith, Ramsey and Witherell, nine miles south of Greenwater, at Willow Creek basin, high-grade silver ore has been found.

NEVADA COUNTY

Banner Mining Company—In this old mine, now being reopened, the 700 level has been reached, and the Knowles station pump recovered.

Cold Spring—In this drift claim, near Nevada City, the gravel deposit recently met has been driven into for 90 ft., and a cross-cut is being made to see whether or not it is the old Harmony channel.

Idaho-Maryland Company—At this old mine, Grass Valley, Bray Wilkins, manager, as soon as timbers arrive, the work of reopening the old shaft will be commenced, and from its bottom sinking will be resumed.

Sugar Loaf Hill Mining Company—This newly organized company is to operate the old Coan mine, at Indian Flat, Nevada City district. Thomas N. Coan is manager.

PLACER COUNTY

Cash Rock—Work has been resumed on this claim in the middle fork of the Arkansas river. A dredger will be built in the river for handling the tailings. The mine has been worked off and on since the early 50's.

Gravel—E. W. Drummond has bonded all the gravel claims on the northern slope of Georgia hill, south of Yankee Jims, from the Mameluke claim to the western end of the hill. The Mameluke tunnel is being reopened.

Northern California Gold Mines Company—This company is now employing 75 men, on the Herman mine, and grading is being done for the new electric power plant. Much new machinery has recently been purchased. The present 10-stamp mill will be increased to 40 stamps. F. R Sherwin is superintendent.

PLUMAS COUNTY

Dredging Ground—Alfred Hoppen, of Alameda, has bonded the William Short property, at Greenville, and is drilling it to prospect the gravel, with a view of putting in a dredge.

SAN BERNARDINO COUNTY

Dry Washers—Henry Fountain, W. H. Laird and A. C. Clark, of New York, have secured title to 1000 acres of placer ground in the Coal Yard camp, 20 miles north of Barstow, and have made a contract with Calvin Baker to install 20 dry washing machines.

Ivanpah Mammoth Gold and Copper Company—This San Diego company has acquired a group of 25 mining claims in the Ivanpah Valley region, and a mill will be put up.

Lucky Strike—On this mine, in Millard cañon, six miles northeast of Banning, good copper ore carrying gold and silver is being mined by Faris & Entwistle, who are opening a group of 12 claims.

TEHAMA COUNTY

California & Massachusetts Copper Mining Company—This company, working the Tom Head mines, continues blocking out ore, and is finding native copper frequently. The compressor plant will be hauled to the mine as soon as the bridges are finished.

TRINITY COUNTY

Brown Bear—Charles L. Reynolds, of San Francisco, has secured an option on this famous old mine, at Deadwood. The mine has been worked by lessees the past few years, and has a high record of bullion production.

TUOLUMNE COUNTY

Eagle-Shawmut Mining Company—At this mine 100 stamps are being operated. Twenty new concentrators will soon be added to the mill, and a double hoist is to be installed in the winze at the 1250 level.

Mount Jefferson—This mine at Groveland will soon be put in operation. It was closed down owing to high cost of water and power, but with the completion of the electric plant, this difficulty is overcome.

Colorado

LAKE COUNTY—LEADVILLE

Breece—Lessees on Breece hill are producing about 100 tons of iron ore daily

and expect to increase this tonnage steadily.

Cleveland—One of the richest gold veins in the Leadville district is located in this property in South Evans gulch, owned and operated by the Monarch Mining Company. The vein runs high in gold, silver, lead and copper. The ore channels differ somewhat from those in other parts of the district; besides the vein mentioned, immense bodies of low-grade ore are encountered. The mine has reached a depth of 614 ft. A streak of ore which averages 4 in. in width and carries 2 oz. gold, 70 oz. silver and 70 per cent. lead, was encountered while cutting a station at this point. Streaks of solid sulphides are found in the pay mineral, while next to the sulphides streaks of oxidized matter and talc are found, which yield gold in a placer digger's pan. The high-grade ore is picked out and sacked at the breast of a drift and, when this is worked out for several feet, blasting brings down the second-class material.

Garbutt Property—The shaft on the property has been sunk to a depth of 600 ft. and arrangements for further sinking have been completed. The lessees have been developing a profitable vein of copper ore.

Grand View Group—W. F. Pease is operating this group in Empire gulch. Several shipments of good lead-silver ore, encountered in one of the tunnels, have been made and the question of putting in a switch is being discussed. In exploring the property large bodies of low-grade ore have been discovered and it is the intention of the lessees to erect a mill as soon as necessary tests are made.

Fanny Rawlins—About 25 tons of oxidized and sulphide ores are being shipped from the orebodies.

Fryer Hill—Since the railroad strike has been settled, conditions on Fryer hill are again at normal and shipping has been renewed. The Silver and American are taking out a considerable amount of silicious ores, the former shipping two tons per day, while the Tip Top, Climax and Dunkin are adding their quota. The Robert E. Lee has been put in first-class condition and about a car of silicious material is being shipped daily.

Hopkins Property—At this property a rock slide recently occurred east of the tunnel. When the loose material had been cleared away it was found that the slide had revealed a vein 7 ft. wide at the top and 5 ft. at the bottom, and assays of samples from the face showed gold, silver, lead and copper. The lessees have turned their attention to the new vein and have commenced shipping the ore.

Seneca Shaft—A good body of iron ore has been broken into in this shaft. Shipments will soon be made.

Idaho

Custer County

Empire Copper Company—This company, which owns the smelting works at Mackay and mines consisting of 38 claims with more than five miles of underground workings, reports the production of more than 4,000,000 lb. of copper during the past year. The Oregon Short Line has built a standard-gage line 85 miles long to the smelter from its main line.

Shoshone County

Flynn Group Mining Company—This company which owns a group of 14 claims adjoining the Frisco and the Black Bear Fraction, near Wallace, will drive a 4000-ft. tunnel to cut the ledge at a depth of about 2000 ft. Machinery has been purchased to facilitate the work.

Nine Mile Mining Company—The directors of this company have levied an assessment of two mills a share on the capital stock payable on or before September 2. They decided to run a raise from a point about 3000 ft. from the portal of the lower tunnel to connect with the upper tunnel.

Michigan

Houghton County—Copper

Calumet & Hecla—At the annual meeting of this company held in Boston, Aug. 21, counsel for A. S. Bigelow of the Osceola Mining Company, presented a long list of questions regarding the operations of the company. The questions referred to the cost of operations in detail, mining costs, smelting costs, character of rock treated, the amount of refined copper obtained, etc., and certain explanations concerning the balance sheet contained in the report recently issued. President Agassiz stated that he would answer certain of the questions, but that he would refuse to consider the others because the information might be used against the company's interests, and that the stockholders had authorized the officers to withhold information which would be of a detrimental character. He stated that the mill which the company is erecting at Buffalo is designed for electrolytically refining 20,000,000 lb. of copper anodes annually. The cost of rebuilding mills up to the present time had been $850,000, spread over a period of four years. The La Salle mine, property of a subsidiary company, has one shaft in promising ground and the other shafts have struck the lode. The Gratiot in the Nonesuch shaft has found promising ground, but the other shafts show only sporadic traces of copper. The directors of the company were re-elected by a vote of 75,072 shares of which 65,094 shares were proxies sent to the management by shareholders.

Montana

Butte District

Anaconda—On account of a strike of machinists the company is operating the Never Sweat mine only half time, but is making up the ore shortage at the other mines. The hoisting engine of the Sweat requires the attention of mechanics almost continuously, for the ground on which the foundation rests is settling. A large station is being cut at the 2800-ft. mark in the High Ore shaft, but some time will be required to finish the work.

Boston & Montana—Mining has been again suspended in the West Colusa on account of gas from the Minnie Healey, and will not be resumed for about two weeks, by which time it is expected that new openings will be carrying off the gas. The company is maintaining its output of ore by working the Pennsylvania and Mountain View more rapidly.

Coalition—The company has drifted and connected the opening with a winze at the 1800-ft. level of the old vein cut recently. This connection gives the level plenty of air. The fire in the Minnie Healey is still burning, but it is said to be well in hand, having been surrounded by the fire-fighting crew. An air shaft is being sunk almost directly above the fire and is between 600 and 700 ft. deep. It is expected to reach the burning zone in about two weeks. The connection will give the fumes an up-draft and clear the workings of the West Colusa, so that mining can be resumed. The company is shipping an average of 1250 tons of ore a day.

North Butte—Drifting on the Edith May vein is progressing at the 1800-ft. level and the face of the crosscut on this level is nearing the Jessie. The Berlin vein has not yet been tapped by the crosscut on the 1600. The company will begin sinking the main shaft to the 2000 in a few days.

Original Company—This company has cut a 6-ft. vein of copper-silver ore at 500 ft. in the Elm Orlu, on which it is sinking a deep shaft to develop this mine and the Poser, both owned by the company.

Bullwhacker—The company has ceased shipping ore on account of the drop in the price of copper and passed the monthly dividend of a cent a share. It has resumed sinking and is experimenting with a leaching plant to treat its output. The ore is a silicate of copper and will not concentrate. Thousands of tons of it are exposed in the mine, which is east of the flat.

Butte & Bacorn—The face of the crosscut south of the 1000-ft. station of the Calumet is supposed to be close to the second vein. Drifting is in progress east on the north vein, and when No. 2 is cut south a drift will be carried west on it.

Reins Copper—The company has opened

7 ft. of good copper ore on the 900-ft. level and is making regular shipments from it, 300 tons having been extracted during one week.

Nevada

ESMERALDA COUNTY—GOLDFIELD

Chicago-Florence—This lease on the Florence is being developed by a crosscut at the 160-ft. level. The ground is only 120 ft. from the southern line of the Little Florence and it is expected that the rich vein now being worked in that property will be picked up in the crosscut.

Consolidated—The Mohawk-Combination Lease is shipping 160 tons of high-grade ore daily. The fortnightly dividends average $50,000, but they will shortly be increased.

Dixie—At the 360-ft. level a large body of high-grade milling ore has been developed. Shaft sinking will be resumed.

Little Florence—The lessees expect to increase the daily shipments of ore to 150 tons. The ore shipped to Aug. 1 returned $575,302, from which dividends amounting to $300,000 were paid. Ore is now being raised from a winze at a depth of 300 ft. The vein is 6 ft. wide.

Rochester—The drifts at the 200-ft. level are following a large vein carrying good milling ore. Sinking will shortly be resumed.

Simmerone—The crosscut on the 250-ft. level is approaching the vein which on the surface yielded bonanza ore.

Ore Shipments—Ore output for the week ended Aug. 15 is reported as follows: Shipped to smelters, 470 tons; to Nevada-Goldfield Reduction Works, 2072; to Western Ore Purchasing Company, Columbia, 708; to Combination Mill, 560; total, 3810 tons.

NYE COUNTY—BULLFROG

Bonnie Claire—A contract has been let for hauling the shipping ore to the smelters and the first shipment will go forward within a week. The new 10-stamp mill is in operation.

Indiana—This mine has recently changed hands and will now be developed by a California company known as the Gold Note Mining Company. The new owners will start sinking operations at once. A new plant has been ordered.

Lucky Jack—The main shaft has reached the 320-ft. level. It will be sunk to the 400-ft. level where crosscutting will be undertaken with the view of intersecting the Shoshone veins.

Mayflower—The shaft has been carried down to the 400-ft. level. Cross-cutting has been started at this level, and the vein will be cut within the next fortnight.

Montgomery-Shoshone—The shaft has been sunk to the 550-ft. level. Drifting is in progress at the 500-ft. level on one of the large ledges which carries milling ore. The cross-cut from the 400-ft. level is approaching the Polaris vein which will be developed from this level. Work in the Polaris is confined to blocking out ore. The new hoisting plant has been erected and will shortly undergo a trial run. It is capable of serving all purposes to a depth of 1500 ft.

National Bank—This property has joined the regular shippers. The shipping ore is raised from the 200-, 300-, and 400-ft. levels. The most important of recent developments are the finding of a new vein in the cross-cut from the 400-ft. level and the cutting of a large vein carrying milling ore in the western face of the 300-ft. level.

Shoshone-Extension—The shaft is down 400 ft. A large amount of lateral development will be carried out at this level

NYE COUNTY—MANHATTAN

Big Mogul—The shaft on the Union Claim is down 50 ft. and is in broken vein matter containing bunches of ore of shipping grade.

Doane Lease—The shaft is in vein matter showing free gold and all the material raised during the sinking is being saved for mill treatment.

Gould-Putnam—High-grade ore is being raised in this lease.

NYE COUNTY—TONOPAH

German-American—This mine is being prospected by means of a newly installed diamond drill. The drill is installed at the 568-ft. level, and bores at the rate of 12 ft. per day.

Jim Butler—Development operations are being pursued on the 400-, 500- and 600-ft. levels. In addition to a large quantity of milling ore stored on the dumps, regular shipments of high-grade ore are going forward to the smelters weekly.

Little Tonopah—Mining has been resumed on this property, which is situated on the flat country westward from the Midway and northwest from the Tonopah Extension. Some of the rich veins in the Midway mine are believed to run into the Little Tonopah.

Midway—The long north cross-cut of the 800-ft. level is out over 400 ft. The drifts on the ledge cut on the 800-ft. level, 280 ft. north from the shaft, are both in ore of good milling grade. The ledge has a uniform width of 8 ft. This mine is shipping from 40 to 60 tons of ore to the smelters every week.

Montana—A battery of 20 stamps in the new 40-stamp mill has been started on the company's ore. The full plant will not start up for some time owing to lack of power. The power is furnished by the Nevada Electric Power Company from its generating station at Bishop, Cal., and the plant is not at present sufficient to meet the demand upon it.

Ore Shipments—Shipments of ore over the Tonopah Railroad for the week ended Aug. 15 were: Tonopah Company, 759 tons; Belmont, 109; Tonopah Extension, 180; Montana Tonopah, 175; Jim Butler, 80; Midway, 46; total, 1349 tons. Shipments from Goldfield were 1531 tons, making the total over the railroad 2880 tons. Besides the rail shipments the Tonopah Company sent 3400 and the Belmont 1250 tons to the mills.

North Carolina

RANDOLPH COUNTY

Asheboro Copper Mining Company—A contract has been let for a reduction plant to cost about $15,000. A. J. Thurber, Asheboro, is president.

Pennsylvania

BITUMINOUS COAL

New Mining Commission—Governor Stuart has appointed the commission to revise the bituminous-mine laws of the State under the Stineman resolution adopted by the recent legislature.

The commission will hold its meeting in Pittsburg, where all interested may appear and give their views as to needed changes in the laws.

The action of the legislature was the result of inability to agree upon any law regarding the soft-coal mines. The resolution required that the eastern and western sections of the soft-coal regions be represented and allowed the operators and miners to submit names from which the governor named the commission. The members of the commission are: George W. Schleuderberg, Pittsburg; Robert A. Shillingford, Shannon, Allegheny county; William Currie, Lilly, Cambria county, and Chief of Mines Roderick.

Laurel Run—Work on a tipple on the coal land on Jacob's creek, recently purchased by W. H. Cochran, of Dawson, has been begun, also grading for the three miles of railway. The property includes about 1000 acres of the Freeport vein. A string of coke ovens will be built at Laurel Run and a coal yard will be opened in Lower Tyrone.

Southern Connellsville Coke Company—This company has let a contract for opening a mine and erecting 100 coke ovens on its coal land at Cheat Haven. A part of the ovens will be ready for operation within 60 days. The coal will be carried from the drift mine to the ovens by aërial tramway.

South Dakota

CUSTER COUNTY

Barifaldi—A 4-ft. ledge of good gold ore has been opened up. State Mine Inspector N. Treweek is making his annual tour of mines in this vicinity.

Black Hills Porcelain Clay and Marble Company—The mica mines west of Custer

have been leased to Sioux City capitalists, who will operate extensively. The company has been reorganized, Chicago interests succeeding stockholders in Michigan and Ohio.

LAWRENCE COUNTY

Ama Queen—Ore averaging high in gold is being developed in the new shoot discovered by the Sherman brothers. It is partly free milling and is in a vein 6 ft. wide.

Branch Mint—President J. D. Hardin has returned from New York and is to start the new 500-ton mill at Galena at once.

C. O. D.—Alex Beckman and associates of Central City have bonded this group of claims to Eastern parties, who will commence work at once.

Gold Queen—Operations have been resumed and the mine is now being unwatered. The shaft will be continued from the 210-ft. level and new drifts will be started.

Elliptic—A party of stockholders on a visit here decided to order more drift work and the continuance of the shaft to quartzite.

Lundberg-Dorr & Wilson Mill—Fred Pennington, Jr., has taken charge of this property, the owners having gone to Utah to be connected with other interests. About 100 tons a day of custom ore is being handled.

Puritan—George V. Ayres has been appointed temporary receiver in order to liquidate debts prior to resumption of operations.

Spencer & Bock—H. McClellan and associates of Broken Bow, Neb., have taken a bond and lease on the claims just over the county line. Machinery will be installed and development work done by drifting.

PENNINGTON COUNTY

Golden West—Stockholders from Chicago have inspected the property and taken Superintendent Smith east to secure more machinery to increase the capacity of the plant to 150 tons per day.

Ohio-Deadwood—P. H. Murphy is in the East arranging for a resumption of operations with the Ohio stockholders.

Wisconsin

LAFAYETTE COUNTY

Leekly Estate—This property, comprising 413 acres upon which are situated the Ollie Bell and the Penna-Benton, has been purchased by the New Jersey Zinc Company. The company also owns 120 acres adjoining and is said to be considering the purchase of other tracts in the Benton district.

Wyoming

LARAMIE COUNTY

Williams Luman—In this new copper mine at Depass on the southeastern end of Copper mountain rich strikes of oxidized ore and native copper have been made. State Geologist H. C. Beeler states that the vein has been developed by an open cut and by a tunnel. No shipments have as yet been made.

Canada

NOVA SCOTIA

Dominion Iron and Steel Company—The trial of the action of this company against the Dominion Coal Company for breach of contract begun at Sydney on July 30 was brought to a close August 20. The expenses are estimated at about $100,000, the testimony of witnesses cover over 1000 pages of foolscap and the exhibits in the case number 350. Judge Longley stated that he would render his decision in about three weeks or a month.

ONTARIO—COBALT DISTRICT

Cobalt Ore Shipments—Shipments of ore from the camp for the week ending Aug. 17 were as follows: Buffalo, 60,000 lb.; La Rose, 43,000; Nipissing 296,808; Timiskaming, 119,011; total, 518,819 lb.

American Silver King—About 12 men are at work on a recently discovered vein from 3 to 5 ft. in width. Stripping has been done for 200 ft., assays showing from 900 to 1200 oz. of silver to the ton.

Cobalt Lake—E. L. Fraleck, engineer, reports that in shaft No. 4 the station at the 86-ft. level has been blasted out and sinking continued to 92 ft. A station has been cut at 95 ft. on shaft No. 5 and drifting begun.

Gillies Limit—The first half of a 12-drill compressor has been installed and work will be begun as soon as adequate labor can be obtained. The shaft is down 115 ft. and the drift at the 65-ft. level has been run 150 ft. east and 60 ft. west.

O'Brien—During the past few weeks several good finds have been made. The best vein has been stripped for 60 ft., and three small but rich stringers found running through wall rock shot with silver for a width of 3 ft. The stringers run as high as 4000 oz. to the ton. A mass of ore runs unbroken for 60 ft. One of the other veins is rich though narrow and two others are fair. The mine has 130 men at work.

Mexico

COAHUILA

Compañia Carbonifera de Sabinas—This company has completed arrangements to increase its capital to $5,000,000 in order to double the production of coal which is now 1000 tons per day. The property covers about 20,000 acres of coal land 20 km. west of the Sabinas station of the International Railroad. Ernesto Madero, of Monterey, is president of the company. The increase of capital is being financed by the Mexican Mining and Industrial Corporation, Ltd., a new English company.

DURANGO

Boca del Cobre—Several traction engines are to be used in transporting ore from this mine to Bermejillo station, in place of the burros now carrying ore to Pedriceña. A road has been built which avoids crossing the Nazas river.

SINALOA

El Progreso Mexican Mines, Ltd.—Shares in this company to the number of 120,000 are offered in London at 5s. each. The purpose is the development of the following mines about 120 miles west of the city of Durango: El Oro, El Manantial, Animas, El Progreso, El Refugio, and Plomo Chico, comprising an area of about 90 acres.

Africa

RHODESIA

Gold production in July was 54,271 oz. bullion, being 647 oz. less than in June. For the seven months ended July 31, the total was 310,899 oz. bullion in 1906, and 346,046 oz. in 1907; an increase of 35,147 oz. The bullion reported this year was equal to 307,981 oz. fine gold, or $6,365,967 in value.

Other production reported this year includes 47 tons copper; 416 tons lead; 64 tons antimony ore; 24 tons scheelite; 2 tons wolframite; 5703 tons chrome ore. Coal production from the Wankie mines was 66,243 in 1906, and 66,076 tons in 1907; a decrease of 167 tons.

TRANSVAAL

The complete returns for July show a gold production of 532,711 oz. fine. For the seven months ended July 31, the total was 3,148,242 oz. in 1906, and 3,671,443 oz. in 1907; an increase of 523,201 oz. The fine gold reported this year was $75,882,525 in value.

The Witwatersrand Native Labor Association reports that during July 7952 natives were distributed to the mines, while 8146 are included under the heading of time expired and other wastage; the loss of natives is, therefore, 194, which follows a more serious loss of 1882 in the previous month. The total number employed at the end of July at all the mines outside the Robinson group was 89,593, as against 89,787 in June and 76,995 in July, 1906.

WEST AFRICA

Gold production in July is reported at 22,498 oz. bullion. For the seven months ended July 31, the total was 120,250 oz. bullion in 1906, and 166,982 oz. in 1907; an increase of 46,732 oz. The bullion reported this year was equal to $3,242,786, or 156,884 oz. fine gold.

Metal, Mineral, Coal and Stock Markets

Current Prices, Market Conditions and Commercial Statistics of the Metals, Minerals and Mining Stocks

QUOTATIONS FROM IMPORTANT CENTERS

Coal Trade Review

New York, Aug. 28—The anthracite trade is quiet, and shows no material change from the last report. The demand for the coastwise trade to New England is improving slightly, the usual fall spurt beginning early this year, apparently. The demand for small or steam sizes is a little more pressing than it has been. The western trade, especially the Lake trade, is rather quiet; probably on account of the heavy shipments early in the season.

The Eastern bituminous trade is in good condition. Demand appears to be steady, and supplies are not in excess. The coastwise trade, like that in anthracite, is good, and active for the season of the year.

The western coal trade is in fair condition. At one or two points there has been excessive supply, but at most large consuming centers there has been little pressure to make immediate sales. This has been secured in most cases, however, by limiting shipments from the mines. Notwithstanding the troubles of last winter, the disposition to put in large stocks of coal does not seem active, and there is little business doing in excess of current demand. Next month, however, may bring some realization of the winter needs.

Transportation and car supply are sufficiently good, and few complaints are heard on this head.

Coal-traffic Notes

Shipments of coal and coke originating on the Pennsylvania Railroad Company's lines east of Pittsburg for the year to Aug. 17 were as follows, in short tons:

	1906.	1907.	Changes.
Anthracite	2,688,105	3,532,117	I. 844,012
Bituminous	19,668,386	23,969,254	I. 4,300,868
Coke	7,924,861	8,795,377	I. 870,516
Total	30,281,352	36,296,748	I. 6,015,396

The total increase this year over last has been 19.9 per cent.

Shipments of bituminous coal and coke over various railroads in western Pennsylvania and West Virginia for the half-year ended June 30 are reported as follows, in short tons:

	Coal.	Coke.	Total.
Balt. & Ohio	12,703,078	2,885,460	15,588,538
Buff., Roch. & Pitts.	3,439,734	313,654	3,753,388
Penn. lines, N.Y.Cen.	4,022,292	42,692	4,064,984
Pitts. & L. Erie	5,183,800	2,655,115	7,838,915
Norfolk & Western	5,688,265	1,291,037	6,979,302
Total	31,037,189	7,187,958	38,225,127
Total, 1906	29,309,330	6,700,608	36,009,938

The total increase was 2,215,189 tons, or 7.6 per cent. In addition to the tonnage given above, the Baltimore & Ohio carried 427,035 tons of anthracite coal in 1906, and 535,141 tons in 1907; an increase of 108,106 tons.

The coal tonnage over the roads in the Ohio Coal Traffic Association for the six months ended June 30 was as follows, in short tons:

	1906.	1907.	Changes.
Hocking Valley	1,720,112	1,797,673	I. 77,560
Toledo & Ohio Cent.	702,038	820,504	I. 118,466
Baltimore & Ohio	757,711	1,059,258	I. 301,547
Wheeling & L. Erie	1,014,319	1,708,146	I. 693,827
Cleve., Lorain & Wh.	928,756	1,368,583	I. 439,827
Zanesville & Western	466,675	772,046	I. 305,371
Toledo Div., Pen. Co.	1,133,792	1,215,947	I. 82,155
L. Erie, Alliance & Wh.	303,829	608,668	I. 304,839
Marietta, Col. & Clev.	3,099	11,327	I. 8,228
Total	7,030,331	9,362,152	I. 2,331,821

The total shows an increase of 33.2 per cent. over last year.

Coastwise shipments of coal from the chief Atlantic ports for the half-year ended June 30 are reported as follows:

	Anthracite.	Bituminous.	Total.
New York	8,591,079	6,647,468	15,238,547
Philadelphia	1,176,352	2,318,347	3,494,699
Baltimore	125,837	1,752,502	1,878,339
Newport News	.....	1,321,001	1,321,001
Norfolk	.....	781,618	781,618
Total	9,893,268	12,820,936	22,714,204
Total, 1906	7,924,274	10,952,010	18,876,284

The total increase this year was 3,837,920 tons, or 20.3 per cent.

Coal receipts at St. Louis for the six months ended June 30 were 3,626,261 tons in 1906, and 3,668,022 tons in 1907; an increase of 41,761 tons.

The coal tonnage originating on the lines of the Southern Railway for the six months ended June 30 was: Tennessee district, 888,723; Alabama district, 1,072,702; total, 1,961,425 short tons.

Pittsburg Coal Company—This company's statement for the seven months ended July 31 is as follows:

	1906.	1907.	Changes.
Earnings	$2,846,054	$3,102,431	I. $256,377
Depletion of coal lands	$ 435,930	$ 419,054	D. $ 16,876
Depreciation	672,235	573,099	D. 99,136
Interest	685,475	639,226	D. 46,249
Total charges	$1,793,640	$1,631,379	D. $162,261
Net surplus	$1,052,414	$1,471,052	I. $418,638

The increase in surplus this year was 39.8 per cent. The depletion of coal lands is made up by a fixed charge on all coal mined.

New York

Anthracite

Aug. 28—The feature of the hard-coal market this week is the difficulty in supplying the demand for the fine sizes of steam coal. Some of the largest producers are having trouble even in keeping up with their contracts, to say nothing of transient business. The demand seems to prevail not alone at the seaports but along the line also, so that arrivals at tidewater do not show any particular increase, in spite of accelerated production. Prices on the steam sizes have advanced by 25c. per ton, in view of the present shortage, pea coal now selling for $2.95, buckwheat for $2.45, rice for $2.15, and barley for $1.75 per ton, f.o.b. New York harbor.

The prepared sizes, as yet, show no approach of activity, the vacation season not being over. Prices on them remain at $4.65 for broken and $4.90 for egg, stove and chestnut.

Bituminous

The soft-coal trade along the Atlantic seaboard continues to have a strong tone, with a large demand everywhere. Producers are mining all the coal that their facilities will permit, and complain of only the ordinary troubles, such as car shortage and miners' holidays. There has been some inquiry for export, but producers are satisfying home requirements first. Prices seem strong, and advances have been noted in some instances.

The far East is calling for large amounts of coal, which seem to be absorbed promptly on arrival. Some producers report progress on their contracts, but others find difficulty in keeping up. A large volume of coal is steadily going forward into consumers' hands, and must soon make some showing on winter supplies.

The Sound is demanding large tonnages and the better grades in particular are not going forward as fast as desired.

Trade in New York harbor is active, absorbing all coal as quickly as it arrives, and then looking for more. Prices for the good grades of steam coal are quoted at $2.65@2.70, f.o.b. New York harbor shipping ports.

All-rail trade is a little more active and stronger inquiry is noted. This has, no doubt, resulted from the increased demand at tidewater, which has enticed coal there, at the expense of line trade. Transportation from mines to tide is fairly steady and about on schedule. Car supply is fairly good, although some shippers, especially on the Baltimore & Ohio, complain of shortage.

Vessels in the coastwise market are more plentiful, although rates in general still hold up to their last winter's level. There have been a few offers on very large craft at a little below current quotations. Rates from Philadelphia now are as follows:

To Boston, Salem and Portland, $1.10; to Providence, New Bedford and the Sound, 90c.; to Portsmouth, $1.15; to Lynn and Bangor, $1.25; to Bath, $1.20; to Saco, $1.25@1.30, and to Gardiner, $1.30@1.35; towages to the last two ports in addition.

Birmingham

Aug. 26—Coal and coke in Alabama are in strong demand. The production is lively and the output of the mines and ovens is being handled just as quickly as it can be loaded on cars. Good prices obtain. The operators announce they have orders on hand which will require active operation through the entire summer, while the winter trade is beginning to show itself. Much coal is to go from this section to Louisiana, especially to New Orleans, this winter.

The coke trade is strong. Some of the manufacturers are preparing to put on old coke ovens to help out.

Chicago

Aug. 26—The coal market is improving. Both western and eastern coals have been in remarkably good demand in the last week, and firmness is apparent in practically every grade, fine coals alone being weak. The end of the summer normally finds this condition, and this year's developments are about two weeks ahead of the season. Anthracite has developed also as a seller in the last week, owing to the approach of the end of the discount period. Eastern coals especially are strong.

There has been a good deal of buying of Illinois and Indiana lump coal lately and this demand promises to continue. Most of the lump brings $1.85@2.20, car price at Chicago. Run-of-mine brings $1.60@2 and screenings are much less in demand at $1.20@1.40. The demand for western coals is accompanied by a lack of any surplus in the Chicago market, and quick shipments from the mines are demanded, evidencing the needs of consumers. Threshing business continues heavy.

Eastern coals are, in general, not plentiful. Smokeless is actively in demand at $3.90 for lump and $3.35 for run-of-mine; Hocking is also in good demand and brings $3.15@3.25; Youghiogheny and Pittsburg No. 8 are scarce, the former bringing $3.25 for ¾-in. gas, and the latter $2.95 for 1¼-in. Some of the eastern agents report lack of cars as a reason for delayed shipments.

Pittsburg

Aug. 27—The demand keeps up well, and while there does not appear to be any weakness in prices, it is believed on a good tonnage the minimum prices could be shaded. Quotations, however, remain on the basis of $1.15@1.20 for mine-run coal at the mine. The rivers were navigable the first two days this week, and about 5,000,000 bushels of coal went to the lower markets. A larger tonnage would have been shipped, but for the fact that the rise was unexpected, and there was a delay in lowering the wickets at the Davis Island dam, making it necessary to take most of the coal through the locks.

Connellsville Coke—The coke market continues strong, and there is no change in prices, standard Connellsville furnace coke being quoted at $2.75@3 and foundry at $3.25@3.50. The *Courier* in its summary gives the production for the week in both fields at 420,146 tons. The shipments aggregated 13,362 cars, distributed as follows: To Pittsburg, 3849 cars; to points west of Connellsville, 8604 cars; to points east of Connellsville, 909 cars.

Foreign Coal Trade

Imports and exports of coal in France for the half-year ended June 30 are reported as follows, in metric tons:

Imports:	1906.	1907.	Changes.
Coal	7,209,320	7,423,710	I. 214,390
Coke	1,158,250	1,066,790	D. 91,460
Briquets	267,600	324,340	I. 56,740
Total	8,635,170	8,814,840	I. 179,670
Exports:			
Coal	643,010	593,800	D. 49,210
Coke	80,960	70,600	D. 10,360
Briquets	52,760	44,190	D. 8,570
Total	776,730	708,590	D. 68,140

Imports are chiefly from Great Britain and Belgium. Exports include coal supplied to steamships at French ports.

Imports and exports of fuel in Belgium for the six months ended June 30 were as follows, in metric tons:

Imports:	1906.	1907.	Changes.
Coal	2,602,260	2,589,150	D. 13,110
Coke	183,307	184,971	I. 1,664
Briquets	64,486	77,458	I. 12,972
Total	2,850,053	2,851,579	I. 1,526
Exports:			
Coal	2,453,441	2,246,529	D. 206,912
Coke	428,380	418,823	D. 9,557
Briquets	212,030	214,006	I. 1,976
Total	3,093,851	2,879,358	D. 214,493

Imports were chiefly from Germany and Great Britain; exports chiefly to France and Holland.

The coal bunkered, or furnished to steamships engaged in foreign trade at all United States ports in June was 426,134 tons. For the six months ended June 30 it was 2,992,936 tons. Adding this to the exports, previously reported, makes a total of 8,661,178 tons of coal sold for consumption beyond the limits of the United States.

Production of coal in Belgium for the half-year ended June 30, with stocks on hand July 1, are reported as below, in metric tons:

	1906.	1907.	Changes.
Production	11,870,940	11,868,955	D. 1,985
Stocks, July 1	362,333	459,101	I. 96,768

The number of men reported at work in coal mines during the first half of 1907 was 140,863; showing an average output of 84 tons per man.

Iron Trade Review

New York, Aug. 28—The iron and steel markets are still dull, so far as new business is concerned. There is a general holding back on contracting for future deliveries. The furnaces and mills, however, continue busy on existing orders, as for some time past. Buyers seem to be waiting developments.

In pig iron there seems to be some disposition on the part of furnaces to make concessions and lower prices for next-year deliveries are talked about. The Alabama iron men have made a cut of $1 on No. 2 foundry for first-half delivery, and other furnaces have quietly accepted lower figures. For nearer deliveries there does not seem to be much demand just now. Some orders for basic iron are reported, but not in large quantities.

In finished material the only activity has been in plates and to a lesser degree in structural material. Otherwise the markets are quiet, so far as new business is concerned.

Whether this is only a temporary lull, or whether it will continue for some time, is just now the question of primary importance in the trade.

Lake Ore Shipments—Iron ore shipments from the Mesabi range for the first half of the season, now over, are in excess of schedule; that is, every one of the three roads reaching the lake from Minnesota mining districts has shipped to date more than half the amount of ore it figured, at the commencement of the season, might be called for. To be sure the first half of the year is looked on to care for more than half the year's ore traffic; but on the other hand there have been considerable cancelations of orders at some mines, and the schedules have been materially reduced, especially in some grades and classes of ore. It is quite safe to assume that, if things continue as now, there will be ample ore moved in the season, and that all other lake traffic will be well in hand before any probability of winter. Minnesota shipments have been about 15,300,000 tons to date, of which all but about 1,000,000 tons has been from the Mesabi. Last year to this period they were 14,450,000 tons; a gain this year in spite of a late opening, a dock strike and a miners' strike, of 850,000 tons. As the old ranges have shipped in excess of last year to date, and done more than half their season's total, as coal shipments into the west have been excessive to date, and as all other business has been pushed while mines and docks were idle, the lake fleet is in shape for handling whatever may come to it this fall.

Baltimore

Aug. 27—Imports for the week were light, and no ferromanganese was received. Arrivals of iron ore were 9950

tons from Cuba and 5125 tons from Algiers; 15,075 tons in all.

Birmingham

Aug. 20—Iron prices are off $1 per ton, and the effects of the dull market are being felt here. No. 2 foundry is now quoted at $19 for delivery in the fourth quarter of this year, and at $17 for deliveries in the first half of 1908. There is but little spot iron selling for the reason that the manufacturers have none to dispose of. E. T. Shuler, of the Southern Steel Company, said a few days since: "Our company has four furnaces in blast, the probable make for the balance of the year practically sold up, the demand for steel products sufficient to warrant a steady operation of both the mills at Gadsden and Ensley and some inquiry being received as to the probabilities in the future."

Other prominent iron and steel men, when questioned recently, stated that while the iron market is quiet, no complaint can be made of the conditions. The production in Alabama shows little, if any, improvement. Every ton produced is being shipped about as rapidly as it is being taken from the cast sheds. The railroad facilities are satisfactory.

Preparations are being made by machine shops and foundries for enlargements of plants in this district. No change is noted in the steel situation in this State.

Chicago

Aug. 26—Quietness continues in the pig-iron market, sales being very light in number and tonnage. Here and there an order for delivery in the first quarter of 1908 appears, but the market is essentially still confined to small lots for delivery within the last quarter of this year. The only sign of activity is in the field of inquiries, which are giving hope to sales agents. Premiums are not offered or demanded on quick-delivery iron, quotations practically representing small lots for such delivery.

Southern iron for delivery in September brings $20 Birmingham on small lots ($24.35 Chicago). For last-quarter delivery 50c. @ $1 less is the figure and for the first quarter of next year $18 is quoted. Northern iron remains at $24@25 for the last half, the lower quotation for late and the higher for early delivery. Local furnaces have practically no iron left for the last quarter, and for the first quarter quote nominally $23. It is difficult to say at what figure a large order for 1908 delivery could be placed, the demand not existing.

The general outlook for business and the iron trade continues good, and it is difficult to see that the present depression can last much longer. Even a policy of buying only for the needs of the immediate future must result in much larger sales than are now being made.

Coke is stronger, with Connellsville 72-hour selling for $5.90 and West Virginia coke for $5.40 per ton.

Philadelphia

Aug. 28—Brokers and furnace agents who watch the markets closely express the belief that the improvement of the general financial situation, now confidently awaited, will be followed by more confidence in the crude-iron market, more sales and steadier prices. All kinds of crude iron are in the same category this week. There is no movement to report, but some agents say they have opportunities for selling iron if they will yield a point. Basic promises to awaken interest before any other. It has suffered its full share of decline. Foundry iron has stood still, more because of the attitude of makers than the unwillingness of buyers to buy. The mills are eating into their stocks and furnace shipments are being made. Prices are where they were a week ago.

Steel Billets—Shipments are being made on old orders with promptness, and consumers are awaiting supplies which they simply want in their possession Prices are $31.50@32.

Bars—Large consumers are figuring on the possibilities of better terms later on, and in two or three instances have made offers considerably under current quotations. Buyers say cheaper pig iron ought to mean cheaper bars. Best refined and steel bars are 1.85c.

Sheets—The card rates are easily maintained, although large consumers are not anxious to anticipate.

Pipes and Tubes—Business is lighter and naturally so. The oversold condition of the mills warrant strong and steady prices.

Plates—All reports are favorable. Our smaller requirements for boiler plate count up well. Every shop is busy. The shipyard people will be in the market shortly. Nothing is known of quotations, as new business is light.

Structural Material—We have had a quiet week at the offices. Nothing is transpiring to make news. There are several big enterprises in the East that will call for fabricated material on a large scale.

Steel Rails—In the absence of large orders for standard rails, it can be said that orders for trolley line constructions are up to expectations.

Scrap—The scrap market is behaving badly. Dealers are refusing to purchase new supplies until there are some signs of buyers. Quotations mean nothing this week.

Pittsburg

Aug. 27—There are scarcely any encouraging features in the iron and steel markets this week. Some mills report a good run of new business, but in small orders only, and specifications are coming in very satisfactorily in some lines. The tin-plate trade is decidedly dull and bar iron has weakened considerably, prices this week being about $2 a ton lower than have been quoted for several months. The minimum quotation on iron bars this week is 1.65c. Steel bars remain strong at 1.60c. and there will be no change, as large contracts have been made for deliveries through the year and the first half of 1908 at that figure. The plate mills are practically filled up for the year and there is but little open capacity for the structural mills. Business in structural steel has been active for several weeks and negotiations are on for several large tonnages that may result in contracts shortly. A favorable indication for the steel-rail trade for next year was a request received during the week from a certain railroad by the leading railmaker that the same tonnage it took for this year be reserved for 1908. This road took about 75,000 tons of standard bessemer-steel rails this year. In steel-rail circles it is said that the difference over specifications will not interfere with the tonnage for next year. The railroads must have rails and it is confidently expected that a satisfactory adjustment of specifications will be made, when the committee to which the matter was referred gets together and takes action. The report that the relations between the railroads and the railmakers are not altogether harmonious is denied. The railroads want good rails and the makers want a fair price. These matters, it is believed, can be easily settled. The Carnegie Steel Company did not book any orders for standard sections this week, but took several fairly good contracts for light rails. The active demand for billets has stopped and prices are lower. The last purchase of importance was 3000 tons of open-hearth billets by the Carnegie company.

Pig Iron—The iron market is decidedly lower and a serious slump in prices would not be surprising. When the Cambria Steel Company blew in its new No. 8 furnace, with an annual capacity of 150,000 tons, it withdrew as a buyer and the iron it contracted for, for delivery in the third quarter, has been thrown on the market. It was thought this would cause a drop in prices of bessemer iron, but up to date $22, Valley furnaces, is the minimum. This is indicated by the purchase of 6000 tons of bessemer iron by the Jones & Laughlin Steel Company from W. P. Snyder & Co. The iron is for September delivery and the price was $22 a ton. Eastern furnaces are offering foundry iron in this market at reduced prices and this has caused a weakness. On an inquiry for 600 tons of No. 2 foundry one interest quoted $22.25, Pittsburg, today. This represents a cut of nearly $1 a ton from the price named a week ago. The order was not placed, and it is presumed the sale was made by another interest at a lower figure. There is no demand for basic iron, and gray forge continues weak, $21.90,

Pittsburg, being a nominal quotation, but on a good order it is possible that this price could be shaded.

Steel—The demand for crude steel has fallen off and bessemer billets are about $1 a ton lower, being quoted at $29, Pittsburg. Open-hearth billets may be had at $31@31.50. Sheet-bars are in strong demand and remain firm at $31. Tank plate is still quoted at 1.70c. and steel bars at 1.60 cents.

Sheets—No new business of any consequence is being placed, but the market is not considered to have weakened, prices remaining at 2.60c. for black and 3.75c. for galvanized sheets, No. 28 gage.

Ferro-Manganese—The market is a trifle weaker, a sale of two carload lots for prompt shipment being reported at $62, Pittsburg. For fourth quarter $61.50 is quoted.

Salt Lake City

Aug. 24—There is a possibility of a railroad being built into the iron and coal fields of southwestern Utah in the near future. The discovery recently of oil in the Virgin City district and apparently in commercial quantity has attracted capital to the undeveloped resources of the region. A syndicate of prominent Utah and Nevada mining men has acquired extensive interests in coal lands, as well as in oil lands, and has offered to enter into a contract with the San Pedro, Los Angeles & Salt Lake Railroad to guarantee 4000 tons of freight daily for a period of five years as an inducement to build a branch line from Lund to Cedar City, thence to the oilfields, a distance of about 70 miles, and thence down the Virgin river through a rich agricultural and fruit-raising country, and on to the southwest, striking the main line of the San Pedro again at Moapa. The total length of the proposed horse-shoe line would be about 135 miles. The syndicate has also informed the railroad officials that it is in position to build the railroad itself, providing, of course, that an agreement as to future traffic arrangements can be arranged satisfactorily. In Iron and Washington counties are situated some of the most extensive iron deposits in the world and these would be rendered available by the building of the proposed road. However, owing to the prevailing scarcity of fuel throughout the West at the present time the opening of new coal camps is important. Some Utah smelting companies have recently placed orders for coke in Pennsylvania, which is evidence of how alarming the fuel situation really is. The various Utah smelting plants consume about 1000 tons of coal and coke daily.

Cartagena, Spain

Aug. 3—Messrs. Barrington & Holt report on iron and manganiferous ores: Though the sierra continues fairly active and stocks are considerably increasing, the local market is dull owing to the falling off in demand and the reduction in export due to the present high freights. Shipments for the week were 3100 tons to Great Britain and 6550 tons to Rotterdam; 9650 tons in all.

For iron ores prices are, f.o.b. shipping port: Ordinary 50 per cent. ore, 9s. 9d.@ 10s. 3d.; special low phosphorus, 10s. 9d.; specular ore, 55 per cent., 12s. 6d. For manganiferous ores, same delivery, No. 3 ore, 35 per cent. iron and 12 manganese, is 14s. 6d.; no higher grades on the market.

Pyrites—The price of iron pyrites, 40 per cent. iron and 43 sulphur, is 11s. 9d. per ton, f.o.b. shipping port.

Metal Market

Gold and Silver Exports and Imports

NEW YORK, Aug. 28.

At all United States Ports in July and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
July 1907..	$ 7,478,366	$ 3,390,962	Exp. $ 4,087,404
" 1906..	1,302,248	9,834,333	Imp. 8,532,085
Year 1907..	43,779,098	24,859,609	Exp. 18,919,489
" 1906..	32,912,962	72,372,111	Imp. 39,459,149
Silver:			
July 1907..	5,955,052	3,361,10[illegible]	Exp. 2,593,952
" 1906..	4,360,628	3,277,70[illegible]	" 1,082,922
Year 1907.	35,174,251	25,756,71[illegible]	" 9,417,540
" 1906.	37,797,855	26,954,53[illegible]	" 10,843,321

These statements cover the total movement of gold and silver to and from the United States. These figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Movement, New York

For week ending Aug. 24 and years from Jan. 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week...	$1,112,069	$ 44,979	$ 1,154,119	$ 63,049
1907.....	31,353,324	6,767,511	32,102,626	1,327,113
1906	5,946,603	48,771,483	38,856,438	1,393,646
1905.....	38,045,843	1,211,852	21,885,998	2,450,824

Exports of gold for the week were chiefly to Germany; of silver to London. Imports for the week, both gold and silver were from Mexico and South America.

Specie holdings of the leading banks of the world, Aug. 24, are reported as below, in dollars:

	Gold.	Silver.	Total.
Ass'd New York	.....	.....	$203,036,800
England	$184,183,150	.....	184,183,150
France.....	562,068,715	$193,956,010	756,024,725
Germany.....	174,265,000	48,335,000	222,600,000
S, ain..	77,625,000	128,540,000	206,165,000
Netherlands....	29,615,500	28,058,500	57,674,000
Belgium.....	15,553,335	7,776,665	23,330,000
Italy.....	169,225,000	23,620,500	192,845,500
Russia.....	586,565,000	34,520,000	621,085,000
Aust.-Hungary.	227,235,000	60,740,000	287,975,000
Sweden.....	20,695,000	.....	20,695,000

The banks of England and Sweden report gold only. The New York banks do not separate gold and silver in their reports. The European statements are from the cables to the *Commercial and Financial Chronicle* of New York.

The joint statement of all the banks in the New York Clearing House for the week ending Aug. 24 shows loans $1,088,152,000, a decrease of $8,070,100; deposits, $1,048,383,600, a decrease of $11,073,700, as compared with the previous week. Reserve accounts show:

	1906.	1907.
Specie.....	$186,032,800	$203,036,800
Legal tenders.	81,720,200	69,035,500
Total cash	$267,753,000	$272,072,300
Surplus.....	$ 4,290,075	$ 9,976,400

The surplus over legal requirements shows an increase of $682,325, as compared with the previous week this year.

Shipments of silver from London to the East are reported by Messrs. Pixley & Abell as follows, for the year to Aug. 15:

	1906.	1907.	Changes.
India.....	£ 11,095,833	£7,705 924	D. £ 3,389,909
China.....	243,400	.....	D. 243,400
Straits..	1,750	544,012	I. 542,262
Total.....	£ 11,340 983	£8,249,936	D. £ 3,091,047

Receipts for the week were £7000 from the West Indies; £146,000 in bars and £12,500 in Mexican dollars from New York; a total of £165,500. Exports were £650 to Port Said; £369,800 in bars and £19,000 in Mexicans to India; £389,450 in all.

Indian exchange has been steady, and the Council bills offered in London were taken at an average of 16.03d. per rupee. Some silver has been shipped from China to India, and there has also been buying in London on Indian account.

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars.....	$0 52½	$0 54½
Peruvian soles and Chilean.....	0 48	0 50
Victoria sovereigns.....	4.85	4.87
Twenty francs.	3.80	3.86
Spanish 25 pesetas...	4.78	4.80

SILVER AND STERLING EXCHANGE.

Aug.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	Aug.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
22	4.8760	67⅞	31 3/16	26	4 8700	68¼	31⅜
23	4.8760	67¾	31⅛	27	4.8680	68⅜	31⅛
24	4 8720	68¼	31 7/16	28	4 8665	68	31 3/16

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, 0.925 fine.

Other Metals

Aug.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
22	18⅜ @19	17½ @18	77⅜	36¾	5.25	5 55 @5 65	5 40 @5.50
23	18¾ @19	17½ @18	77⅝	36⅜	5.25	5.55 @5.60	5 40 @5.45
24	18 @19	17⅛ @18	.....	37	5.25	5.55 @5 60	5 40 @5.45
26	18 @19	17⅛ @18	76⅞	37	5.25	5.55 @5.60	5.40 @5.45
27	18 @19	17½ @18	78¼	37⅛	5.25	5.55 @5.60	5.40 @5.45
28	18 @19	17⅛ @18	79¼	37⅜	5.25	5.55 @5.60	5.40 @5.45

London quotations are per long ton (2240 lb.) standard copper, which is now the equivalent of the former g.m.b's. The New York quotations for electroytic copper are for cakes, ingots or wirebars, and represent the bulk of the transactions as made with consumers, basis, New York, cash. The price of cathodes is 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting and Refining Company for near-by shipments of desilverized lead in 50-ton lots, or larger. The quotations on spelter are for ordinary western brands; special brands command a premium.

The price of silver in London on Aug. 19 was given in our last issue at 31 4/16d. This was a misprint; the correct figure for that date is 31 9/16 pence.

The silver market, owing to the absence of the Indian government from among the buyers, has not shown any special strength. General orders, however, have kept the situation moderately steady.

Copper—It is reported from different quarters that a great many of the domestic consumers are very low in copper, and while they have so far not entered the market, it is hoped that this event will not be deferred very much longer. In fact, there are rumors of some sales of Lake copper at rather lower prices than officially quoted, but the transactions have not been large enough to attract general attention. European consumers have for some time past been buying only from hand to mouth, and (as they have no stocks) they are right along placing orders for small quantities. They are managing their purchases so cleverly that they are able to make them at steadily receding prices. The close is unsteady at 18@19c. for Lake copper, 17½@18c. for electrolytic in ingots, cakes and wire-bars, 17¼@17½c. for casting copper.

The standard market is keeping up its nervous fluctuations, going up one day and reacting the next. In the early part of the week there was a sharp decline from the high prices reached at the close, and during the remainder there has been a recovery which practically makes the closing the same as last week, the quotations being cabled at £79 5s. for spot, £77 15s. for three months'.

Refined and manufactured sorts we quote: English tough, £79; best selected, £85; strong sheets, £91.

Exports of copper from New York for the week were 1525 long tons. Exports from Baltimore for the week are reported by our special correspondent at 285 long tons.

Copper Sheets—The base price of copper sheets is still 28c. per pound.

Copper Wire—The base price of copper wire has been reduced. For sizes from No. 0000 to No. 8 it is now 24¼c. per pound.

Tin—The London market has taken a sudden upward turn. It is reported that buying by the largest American consumer has brought about the advance. In the home market the advance in the price has not brought forth a freer buying movement, and supplies continue to be taken in a hand to mouth way by domestic consumers. The market in London closes at £169 15s. for spot, £169 5s. for three months'. Business here in retail lots is being done at 37¾ cents.

Lead—The trust price for desilverized remains unchanged at 5.25c., New York; 5.17½c., St. Louis. Outside producers have sold at 5.10c., New York, and as low as 4.95c., St. Louis, and their offerings have been liberal. There is evidently some accumulation of stocks of lead.

The London market has been steady throughout the week and closes unchanged at £19 for Spanish lead, £19 2s. 6d. for English.

The movement of foreign lead in the United States for the half-year ended June 30, is reported by the Bureau of Statistics as below, in short tons:

	1906.	1907.	Changes.
In bond, Jan. 1	8,148	5,691	D. 2,457
Imports, six months	46,407	37,669	D. 8,738
Total supplies	54,555	43,360	D. 11,195
Re-exports, six months	24,263	16,306	D. 7,957
In bond, July 1	6,773	6,607	D. 166
Total deductions	31,036	22,913	D. 8,123
Balance	23,519	20,447	D. 3,072

The balance has, presumably, entered into consumption in the United States.

Spelter—The market for this metal appears to be distinctly weak, owing to a decided falling off in inquiry from consumers. It is understood that the consumption for the manufacture of brass has greatly decreased, but so far the galvanizers have bought up to their maximum capacity. It is now feared that the present weakness is due to an actual falling off in the requirements of galvanizers. The market closes easy at 5.55@5.60c. New York, 5.40@5.45c. St. Louis.

The London market is quoted £21 15s. for good ordinaries, £22 for specials.

Zinc Sheets—The base price is now $7.75 per 100 lb.—less discount of 8 per cent.—f.o.b. cars at Lasalle and Peru, in 60-lb. cases for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive; lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.50c. per 100 lb.

Antimony—The market is dull and lower, and an improvement in conditions is hardly to be looked for until the accumulation of stocks is disposed of. Curtailment of production will help in this. Smelters claim now that there is no profit in the business at the ruling prices for ore and metal. Quotations are 10½@11c. for Cookson's; 9¼@10c. for Hallett's; and 8¼@9½c. for other brands.

Nickel—For large lots, New York or other parallel delivery, the chief producer quotes 45@50c. per lb., according to size and terms of order. For small quantities prices are 50@65c., same delivery.

Quicksilver—Current prices in New York are $40 per flask of 75 lb. for large quantities and $41 for smaller orders. San Francisco orders are $37.50@38.50 per flask, according to quantities, for domestic orders, and $36.50@37 for export. The London price is £7 per flask, but £6 16s. 3d. is quoted by jobbers.

Cadmium — Paul Speier reports from Breslau, Germany, that the cadmium market is quiet; first quality cadmium guaranteed 99.5 per cent. is quoted at 1175@1250 marks per 100 kg., equal to $1.27@1.35 per pound.

Platinum—The market for platinum has recorded a slight advance in price within the past week. Ordinary metal is now selling for $28.50 and hard metal for $31 per troy ounce. The price for scrap continues to advance slowly and now ranges $23@24 per ounce.

Missouri Ore Market

Joplin, Mo., Aug. 24—The highest price paid for zinc was $47 per ton, on an assay base price of $41@44 per ton of 60 per cent. zinc. On account of heavy silicate shipments from Granby and Peoria the average price of the week, all grades, is $40.98 per ton. The highest price paid for lead was $62 per ton, week-end offerings being at $56 per ton. The average price was $59.08.

Following are the shipments of zinc and lead from the various camps of the district for the week ending Aug. 24:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville	2,128,330	691,840	$66,168
Joplin	1,894,440	328,010	52,190
Granby	1,166,000	110,000	17,840
Duenweg	677,350	55,300	16,244
Galena	628,690	95,410	15,966
Prosperity	380,580	258,090	15,795
Alba-Neck City	532,530	49,750	13,448
Oronogo	248,110	51,140	7,093
Aurora	219,910	10,670	6,015
Spurgeon	257,510	13,180	5,777
Baxter Springs	159,230	41,450	4,402
Badger	191,240	.....	4,303
Carthage	145,540	.....	3,274
Sarcoxie	147,650	.....	3,100
Zincite	87,210	5,180	2,417
Sherwood	36,660	13,390	1,341
Peoria	164,360	.....	1,315
Playter	54,110	.....	1,136
Totals	9,119,450	1,723,410	$237,824
34 weeks	404,036,220	61,502,400	$11,697,189

Zinc value, the week, $186,905; 34 weeks, $9,348,069
Lead value, the week, 50,919; 34 weeks, $2,349,120

Average prices for ore in the district, by months, are shown in the following table:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1906.	1907.	Month.	1906.	1907.
January	47.38	45.84	January	75.20	83.63
February	47.37	47.11	February	72.83	84.58
March	42.68	48.66	March	73.78	82.75
April	44.63	48.24	April	75.13	79.76
May	40.51	45.98	May	78.40	79.56
June	43.83	44.82	June	80.96	73.66
July	43.25	45.79	July	74.31	58.18
August	43.56	.....	August	75.36	.....
September	42.58	.....	September	79.64	.....
October	41.55	.....	October	79.84	.....
November	44.13	.....	November	81.98	.....
December	43.68	.....	December	81.89	.....
Year	43.24	.....	Year	77.40	.....

The output is being gradually curtailed by mines closing down that cannot produce ore at the present level of zinc and lead prices. A year ago zinc was only $2 per ton higher, but lead was $20 per ton higher, and while no money was then made on zinc alone, a profit was secured from the lead production. Both ores being low at the same time this year reduces prospective profits to a minimum. Various estimates place the cost of operating in the sheet ground mines at $40 to $44 per ton. This is a large increase in two years, the cost coming from the high price of explosives, repairs and the heavier installation expenses, as well as the higher price of labor in the mines. Some talk of concerted action is in circulation, but as mine operators are farther apart now than for a number of years, it is probable that an enforced shut-down is all that will bring them together.

Chemicals

New York, Aug. 21—The general chemical market remains quiet and rather dull. No new or active business is expected until the fall trade begins to open, next month.

Copper Sulphate—No considerable business is being transacted at present, the disposition being to await some definite action in the metal market. Prices remain unchanged from last week, the leading producer quoting $7 per 100 lb. for carload lots and $7.25 for smaller quantities.

Nitrate of Soda—Although the market is in good condition and a satisfactory business doing, quotations have fallen a little from the high level. For spot delivery 96 per cent. is quoted at 2.45c. and 95 per cent. at 2.40c. For 1908 delivery these grades are 2.50c. and 2.45c., respectively.

Phosphates—J. M. Lang & Co. report shipments of phosphate rock through the port of Savannah, Ga., during the month of July as follows, in long tons: Germany, 6856; Great Britain, 3165; Italy, 1064; Austria, 517; total, 11,602 tons.

Sulphur—Messrs. Emil Fog & Sons report from Messina, Sicily, under date of July 29, as follows: Exports of sulphur from Sicily for June and the half-year ended June 30 were, in tons of 1030 kg. each:

	1906.	1907.	Changes.
June	24,288	20,450	D. 3,838
Half year	243,734	194,777	D. 48,957
Stocks, July 1	439,601	513,468	I. 73,867

For the fiscal year ended June 30 the total exports were 408,921 tons in 1906, and 338,473 tons in 1907; a decrease of 70,448 tons. The exports to the United States were 59,939 tons in 1906, and 13,259 tons in 1907, a decrease of 46,680 tons, or 77.8 per cent.

At a recent meeting of delegates of the Consorzio and of Mr. Frasch, held at Rome, the latter would not relent, but still demanded the total exclusion of Sicilian brimstone from the American market. Mr. Frasch's representative also claimed a right to export to Europe. The Sicilian delegates broke off negotiations and withdrew. It remains now to be seen, if the present administrators of the Consorzio will possess the courage to dump the cheap stock inherited from the Anglo-Sicilian Company on the American market, and, if they dare assume the responsibility of the consequences that such measures will entail. However, there is another and still graver problem looming in the background—the money question. Compelled by necessity, the Banco di Sicilia will henceforward advance only three-fifths instead of four-fifths on brimstone warrants and, in spite of threats of strikes and protests from those exercising mining rights, this institution means to stick by its decision. On the other hand, in order to alleviate as much as possible the present strained position, another 4,000,000 lire were granted to the Consorzio. If the production is not reduced, these sums will last only a very short time and new credits will become indispensable. The government after the Nasi disturbances will certainly do everything in its power to content Sicily. It is, therefore, to be hoped, that additional funds and means may be found, in order to postpone the crisis for the present.

British Chemical Trade—Exports of heavy chemicals from Great Britain for seven months ended July 31 were as follows in cwt. of 112 lb. each:

	1906.	1907.	Changes.
Bleaching powder	568,890	626 901	I. 58,011
Muriate of ammonia	66,665	99,871	I. 33 206
Soda ash	933,182	1,268,962	I. 335,780
Bicarbonate of soda	214,069	255,719	I. 41,650
Caustic soda	916,444	842 773	D. 73,671
Soda crystals	99,255	100.658	I. 1,403
Soda sulphate	506,763	564.027	I. 57,264
Sulphuric acid	54,482	43,917	D. 10,565

Copper sulphate exports were 39,191 tons in 1906 and 40,201 tons in 1907; an increase of 1010 tons.

Imports of chemicals and raw materials into Great Britain for the seven months ended July 31 were, in long tons:

	1906.	1907.	Changes.
Nitrate of potash	137,229	136.462	D. 767
Nitrate of soda	71,562	84,382	I. 12,820
Phosphates	284,890	307.722	I. 22,832
Sulphur	15 083	10,815	D. 4,268
Pyrites	454,977	459,289	I. 4,312

Estimating the sulphur contents of the pyrite, the total imports of sulphur in 1906 were 197,074 tons and 194,531 tons in 1907; a decrease of 2543 tons.

Pyrites—Quotations for domestic pyrites, non-arsenical, are 11@11½c. per unit for furnace size; 10@10½c. for fines. Prices for foreign pyrites are higher than they have been, 14@14½c. per unit being quoted for furnace size, non-arsenical, with 10½@11c. for fines. The tendency of the market is upward and it is thought that foreign may reach 15 or 16c. per unit before the end of the year.

Mining Stocks

New York, Aug. 28—The general stock market is still depressed and uncertain. There have been small rallies followed by small advances on alternate days. The market has been entirely professional, however, so that these changes indicate nothing—except that the situation is still uncertain, and with a depressed tone.

Of the leaders, Amalgamated Copper closed at $70¼, after selling down to $68; American Smelting common closed at $95½; Utah Copper, $23½; United States Steel $31, with $93¼ for the preferred.

The curb market has followed the lead of the Exchange with small fluctuations in both directions. Business has been rather dull, the copper stocks making the best show of trading. Boston Copper varied from $18½ to $20¾; British Columbia between $6½ and $7; Cumberland Ely hung around $7½, and Greene-Cananea around $12½. There was a little trading in the Tonopah and Goldfield stocks, but no material changes. Cobalt stocks were in some demand, but generally at low prices. Nipissing, however, recovered some of its recent losses, selling up to $8½ and closing at the highest.

Boston

Aug. 27—Net results in the prices of leading mining shares the past week show little or no change, although for a spell they had quite a sharp rally late last week. The calling of loans by leading institutions, particularly the National Copper Bank of New York, on copper stocks, held in this city, had a depressing effect, which is reflected in current quotations. Chicago money, it is said, that has been in use in this city for a year and over, has also been called, adding to the disturbance. The deadlock between producers and consumers still exists, according to all that can be gathered. The shut-down of the Butte mines on account of the Butte machinists' strike may help the situation.

Amalgamated, which advanced $1.62½ to $71.37½, went back to $68.87½ today, closing the same as a week ago, at $69.62½. Calumet & Hecla rose $15 to $730, but lost it all, while Calumet & Arizona rose $7 to $157, on declaration of the regular quarterly dividend of $5, payable Sept. 21. Copper Range and North Butte sold together today at $64.25. The former touched $67 last week, against $62.50, the final a week ago, and North Butte $66.25, against $65, the close a week ago. Quincy has been under pressure. After advancing $3 to $98, it yielded to $91.50. Old Dominion stiffened to $31, and reacted to $29.50. This company has done a wise thing by having contracted for a supply of coke, so that its operations will not be restricted this year by lack of fuel. Butte Coalition is up $1.25, net,

for the week to $20.50. It was but a little over a year ago that this company's stock was put out at $15. Since then it has touched $45.

Mohawk rose $4 to $70, reacting to $68.50, and Osceola rose $6 to $110, losing all but $1 of it. Trinity is $1 lower, net, at $16, while Utah Consolidated spurted $4.50 to $42, holding all but a fraction of it.

The annual meeting of the Calumet & Hecla mining company, Aug. 21, was not blocked, even though A. S. Bigelow, president of the Osceola Company, with his 23 shares of Calumet, made every effort to do so with a long list of questions.

Nipissing has been the curb feature, holding most of the advance.

STOCK QUOTATIONS

NEW YORK	Aug. 27
Name of Comp.	Clg.
Alaska Mine	....
Am. Nev. M. & P. Co.	....
Amalgamated	69⅞
Anaconda	45⅝
Balaklala	7⅛
British Col. Cop.	7
Buffalo Cobalt	2⅝
Butte & London	....
Butte Coalition	19⅛
Butte Cop. & Zinc	....
Cobalt Contact	....
Colonial Silver	1⅜
Cum. Ely Mining	7⅛
Davis Daly	9¾
Dominion Cop.	4⅛
El Rayo	3⅞
Foster Cobalt	64
Furnace Creek	⅜
Giroux Mine	7
Gold Hill	1⅛
Granby, New	....
Greene Gold	1⅜
Greene G. & S	1⅛
Greenw'r & D. Val.	75
Guanajuato	2⅞
Guggen. Exp.	180
Hanapah	⅜
McKinley Dar.	⅜
Micmac	4
Mines Co. of Am.	1⅜
Mitchell Mining	2⅛
Mont. Sho. C. (New)	6
Nev. Utah M. & S.	4
Newhouse M. & S.	10⅛
Nipissing Mines	8
Old Hundred	2⅜
Silver Queen	1
Stewart	1⅞
Tennessee Cop'r.	34⅛
Union Copper	1
Utah Apex	5⅜
West Columbus	9

N. Y. INDUSTRIAL	
Am. Agri. Chem.	....
Am. Smelt. & Ref.	94⅛
Am. Sm. & Ref., pf.	95⅛
Bethlehem Steel	....
Colo. Fuel & Iron	23½
Federal M. & S., pf.	71
Inter. Salt	15
National Lead	46
National Lead, pf.	....
Pittsburg Coal	8¼
Republic I. & S.	19⅛
Republic I. & S., pf.	71
Sloss-Sheffield	45¾
Standard Oil	440
Tenn. C. & I.	....
U. S. Red. & Ref.	....
U. S. Steel	30¾
U. S. Steel, pf.	93⅛
Va. Car. Chem.	20
Va. I. Coal & Coke	....

ST. LOUIS	Aug. 24	
N. of Com.	High.	Low.
Adams	.40	.30
Am. Nettie	.04	.03
Center Cr'k	2.50	2.25
Cent. C. & C.	69.00	67.00
C.C. & C. pd.	79.00	78.00
Cent. Oil	115.00	110.00
Columbia	5.00	4.50
Con. Coal	27.00	25.50
Doe Run	150.00	140.00
Gra. Bimet.	.37	.30
St. Joe.	17.00	15.00

BOSTON	Aug. 27
Name of Comp.	Clg.
Adventure	2½
Allouez	34
Am. Zinc	....
Arcadian	5
Atlantic	12
Bingham	12
Boston Con.	20⅜
Calumet & Ariz.	155
Calumet & Hecla	715
Centennial	....
Con. Mercur	42
Copper Range	65
Daly-West	13⅝
Franklin	10⅛
Greene—Can.	12½
Isle Royal	15½
La Salle	13
Mass.	....
Michigan	12
Mohawk	68⅛
Mont. C. & C. (new)	....
Nevada	....
North Butte	64½
Old Colony	....
Old Dominion	29½
Osceola	105
Parrot	14½
Phoenix	....
Quincy	92⅛
Rhode Island	4
Santa Fe	2½
Shannon	13⅜
Tamarack	79
Trinity	16
United Cop., com.	52
U. S. Oil	....
U. S. Smg. & Ref.	38¾
U. S. Sm. & Re., pd.	39
Utah Copper	41⅛
Victoria	5⅞
Washington	....
Winona	5⅛
Wolverine	142
Wyandotte	...

*Ex. Div. †Ex. Rights.

BOSTON CURB	
Ahmeek	....
Ariz. Com	15½
Black Mt.	....
East Butte	....
Hancock Con.	7¾
Keweenaw	7¾
Majestic	....
Raven	1¼
Shawmut	....
Superior	....
Superior & Pitts	14⅛
Troy Man	....

LONDON	Aug. 28		
Name of Com.	Clg.		
Dolores	£1	5s	0d
Stratton's Ind.	0	2	6
Camp Bird	0	19	6
Esperanza	2	1	3
Tomboy	1	8	9
El Oro	1	5	0
Oroville	0	16	6
Somera	1	1	3
Utah Apex	0	15	0
Ariz. Cop., pfd.	3	3	1
Ariz. Cop., def.	3	2	3

Cabled through Hayden, Stone & Co., N. Y.

S. FRANCISCO	Aug. 22
Name of Comp.	Clg.
COMSTOCK STOCKS	
Belcher	.22
Best & Belcher	.75
Caledonia	.32
Challar	.19
Con. Cal. & Va.	.84
Crown Point	.24
Exchequer	.38
Gould & Curry	.27
Hale & Norcross	.58
Mexican	.59
Ophir	1.05
Overman	.11
Potosi	.17
Savage	.90
Sierra Nevada	.33
Union	.40
Utah	...
Yellow Jacket	.99
TONOPAH STOCKS	
Golden Anchor	.14
McNamara	.25
Montana-Pitts. ex.	...
North Star	.16
Rescue	.12
GOLDFI'D STOCKS	
Black Ants	.06
Blue Bull	.33
Columbia Mt.	.50
Comb. Frac	2.12
Conquerer	.14
Daisy	1.55
Florence	4.70
Frances-Mohawk	1.10
Goldfield Con.	7.60
Grandma	.20
Great Bend	.67
Red Hills	.53
St. Ives	.90
BULLFROG STOCKS	
Amethyst	.25
Bonnie Claire	.45
Mayflower Con.	.34
Montgomery Mt.	.10
Original	.07
MANHAT'N STOCKS	
Gold Wedge	.06
Manhattan Mg	...
Pine Nut	.06
Ruby Wonder	.25
Stray Dog	.16
Yellow Horse	.03

NEVADA (Weir Bros. & Co., New York)	Aug. 28
TONOPAH STOCKS	Clg.
Tono'h Mine of N.	10.62½
Tonopah Exten	1.10
Montana Tonop'h	2.95
Belmont	2.62½
Tonopah Midway	.70
West End Con.	.60
Jim Butler	.83
GOLDFI'D STOCKS	
Sandstorm	.40
Kendall	.28
Red Top	3.50
Jumbo	3.50
Goldfield Mining	1.55
Dia'dfield B. B. C.	.24
Atlanta	.53
Mohawk	16.00
Silver Pick	.54
Laguna	1.55
BULLFROG STOCKS	
Mont. Shoshone C.	6.00
Tramps Con.	.35
Gold Bar	.60
Bullfrog Mining	.13
Bullfrog Nat. B	.17
Homestake Con.	...
MANHAT'N STOCKS	
Manhattan Con.	.42
Manhat'n Dexter	.12
Jumping Jack	.08
Stray Dog	.17
Indian Camp	.08

COLO. SPRINGS	Aug. 23
Name of Comp.	Clg.
Acacia	8½
Black Bell	...
C. C. Con.	4½
Dante	5
Doctor Jack Pot	6
Elkton	46¾
El Paso	37
Findlay	38
Gold Dollar	....
Gold Sovereign	4
Isabella	20½
Index	....
Jennie Sample	....
Jerry Johnson	4½
Mary McKinney	....
Pharmacist	....
Portland	1.05
Un. Gold Mines	5¾
Vindicator	....
Work	16½

New Dividends

Company.	Payable.	Rate.	Amt.
American Coal	Sept. 3	$1.25	62,500
Am. Smelters Sec., A	Sept. 1	1.50	255,000
Am. Smelters Sec., B	Sept. 1	1.25	375,000
British Columbia	Sept. 4	0.40	122,000
Boston & Montana	.....	12.00	1,800,000
Butte Coalition	Sept. 17	0.50	500,000
Gen. Chemical, com.	Sept. 3	2.00	148,206
Jamison, Cal.	Sept.	0.02	7,800
Mexican Con. M. & S.	Aug. 26	0.50	120,000
Mines Co. of Am.	Aug. 26	0.02	40,000
National Lead, com.	Oct. 1	1.25	186,318
National Lead, pfd.	Sept. 16	1.75	260,820
Newhouse	Aug. 31	0.50	300,000
Parrot	Sept. 18	0.25	57,463
Philadelphia Gas, pfd	Sept. 2	1.25	150,000
Republic Iron & Steel	Oct. 1	1.75	437,500
Sloss-Sheffield, pfd.	Oct. 1	1.75	117,250
Standard Oil	Sept. 14	6.00	5,820,000
U. S. C. I Pipe & Fdy., com.	Sept. 2	1.00	121,063
U. S. C. I. Pipe & Fdy., pfd.	Sept. 2	1.00	121,063
U. S. Steel, pfd	Aug. 30	1.75	6,305,497
Yellow Aster	Aug. 5	0.20	20,000

Assessments

Company.	Delinq.	Sale.	Amt.
Black Diamond, U.	Aug. 31	Sept. 30	$0.01
Bullion, Nev	Sept. 12	Oct. 4	0.05
Butler Liberal, U	Aug. 16	Aug. 31	0.01
Caledonia	Sept. 12	Oct. 2	0.10
Challar, Nev.	Aug. 19	Sept. 12	0.10
Con. Cal. & Va.	Aug. 14	Sept. 4	0.25
Confidence, Nev	Aug. 27	Sept. 17	0.20
Con. Imperial	Aug. 27	Sept. 19	0.01
Douglas, Idaho	Sept. 16	Oct. 4	0.008
Grand Pacific, Cal.	Aug. 10	Oct. 2	0.02
Mariposa C. & M., C.	Aug. 13	Sept. 2	10.00
Mt. Diablo, Nev	Aug. 20	Sept. 16	0.20
Nassau Cop., Cal.	Sept. 16	Oct. 14	0.10
N. Y. Bonanza, Utah	Sept. 2	Sept. 23	0.02
Placer Queen, Cal	Sept. 16	Oct. 7	0.00½
Sailor Consol., Cal.	Sept. 10	Oct. 7	0.01
Sheba G. & S., Utah	July 30	Nov. 2	0.10
Sierra Nevada, Nev.	Sept. 4	Sept. 25	0.10
Union Con., Nev.	Aug. 12	Sept. 3	0.10

Monthly Average Prices fo Metals

AVERAGE PRICE OF SILVER

Month.	New York.		London.	
	1906.	1907.	1906.	1907.
January	65.288	68.673	30.113	31.769
February	66.108	68.835	30.464	31.852
March	64.597	67.519	29.854	31.325
April	64.765	65.462	29.984	30.253
May	66.976	65.981	30.968	30.471
June	65.394	67.090	30.185	30.893
July	65.105	68.144	30.113	31.366
August	65.949	.....	30.529	.....
September	67.927	.....	31.483	.....
October	69.523	.....	32.148	.....
November	70.813	.....	32.671	.....
December	69.050	.....	32.003	.....
Year	66.791	.....	30.868	.....

New York, cents per fine ounce; London, pence per standard ounce.

AVERAGE PRICES OF COPPER

	NEW YORK.				LONDON.	
	Electrolytic		Lake.			
	1906.	1907.	1906.	1907.	1906.	1907.
January	18.310	24.404	18.419	24.825	78.869	106.739
February	17.869	24.869	18.116	25.236	78.147	107.356
March	18.361	25.065	18.641	25.560	81.111	106.594
April	18.375	24.224	18.688	25.260	84.793	98.625
May	18.475	24.048	18.724	25.072	84.867	102.375
June	18.442	22.665	18.719	24.140	83.994	97.272
July	18.190	21.130	18.585	21.923	81.167	95.016
August	18.380	....	18.706	.....	83.864	....
September	19.033	.....	19.328	....	87.831	.....
October	21.203	.....	21.722	.....	97.269	.....
November	21.833	.....	22.398	.....	100.270	.....
December	22.885	.....	23.350	....	105.226	.....
Year	19.278	.....	19.616	.....	87.282	.....

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling, per long ton, standard copper.

AVERAGE PRICE OF TIN AT NEW YORK

Month.	1906.	1907.	Month.	1906.	1907.
January	36.390	41.548	July	37.275	41.091
February	36.403	42.102	August	40.606	.....
March	36.662	41.313	September	40.516	.....
April	38.900	40.938	October	42.852	.....
May	43.313	43.149	November	42.906	.....
June	39.260	42.120	December	42.750	....
			Av. year	39.819	.....

Prices are in cents per pound.

AVERAGE PRICE OF LEAD

Month.	New York.		London.	
	1906.	1907.	1906.	1907.
January	5.600	6.000	16.850	19.828
February	5.464	6.000	16.031	19.531
March	5.350	6.000	15.922	19.703
April	5.404	6.000	15.959	19.975
May	5.685	6.000	16.725	19.688
June	5.750	5.760	16.813	20.188
July	5.750	5.288	16.525	20.350
August	5.750	.....	17.109	.....
September	5.750	.....	18.266	.....
October	5.750	.....	19.350	.....
November	5.750	.....	19.281	.....
December	5.900	.....	19.609	.....
Year	5.657	.....	17.370	.....

New York, cents per pound. London, pounds sterling per long ton.

AVERAGE PRICE OF SPELTER

MONTH.	New York.		St. Louis.		London.	
	1906.	1907.	1906.	1907.	1906.	1907.
January	6.487	6.732	6.337	6.582	28.225	27.125
February	6.075	6.814	5.924	6.664	25.844	25.938
March	6.209	6.837	6.056	6.687	24.563	26.094
April	6.078	6.685	5.931	6.535	25.781	25.900
May	5.997	6.441	5.846	6.291	27.000	25.563
June	6.006	6.419	5.948	6.269	27.728	24.469
July	6.006	6.072	5.856	5.922	26.800	23.850
August	6.027	.....	5.878	.....	26.938	.....
September	6.216	....	6.056	.....	27.563	.....
October	6.222	.....	6.070	.....	28.075	.....
November	6.375	.....	6.225	.....	27.781	.....
December	6.593	.....	6.443	....	27.938	.....
Year	6.198	.....	6.048	.....	27.020	....

New York and St. Louis, cents per pound. London in pounds sterling per long ton.